

31-000 Data Communications (First or Second Communications Adapter)

CONTENTS

31-010	Introduction
31-100	Locations
31-110	EIA/CCITT
31-120	2400 BPS Integrated Modem
31-130	1200 BPS Integrated Modem
31-140	Digital Data Service Adapter
31-150	External Cables
31-200	Adapter Card
31-300	1200 BPS Integrated Modem
31-310	Card Switch Settings
31-320	Line Plate Adjustment
31-340	Transmit Level Limiting Check
31-400	2400 BPS Integrated Modem
31-410	Operator Panel
31-414	Test/Operate Diagnostics
31-420	Transmit Level Limiting Check
31-430	Signal Quality Meter Adjustment
31-440	Dial Tone Detect
31-450	Interface Signal Timings
31-460	Card Check
31-470	Card Jumpers
31-480	Waveshapes
31-500	Digital Data Service Adapter
31-600	EIA/CCITT Interface
31-610	Card Jumpers
31-620	EIA/CCITT Modem Control Lines

31-010 INTRODUCTION

Data communications is an optional feature that lets System/34 function as a primary station (SDLC only) or a terminal in a point-to-point or multipoint network. Two communication features can be installed and run at the same time. The hardware associated with line 1 is described as line 1. The hardware associated with line 2 is described as line 2. Data is transmitted and received serial-by-bit and serial-by-character over voice-grade communication networks (switched or nonswitched), or over DDSA. The system may be connected to a half-duplex or duplex network but the adapter operates in half-duplex mode only; that is, data transmission is only in one direction at a time.

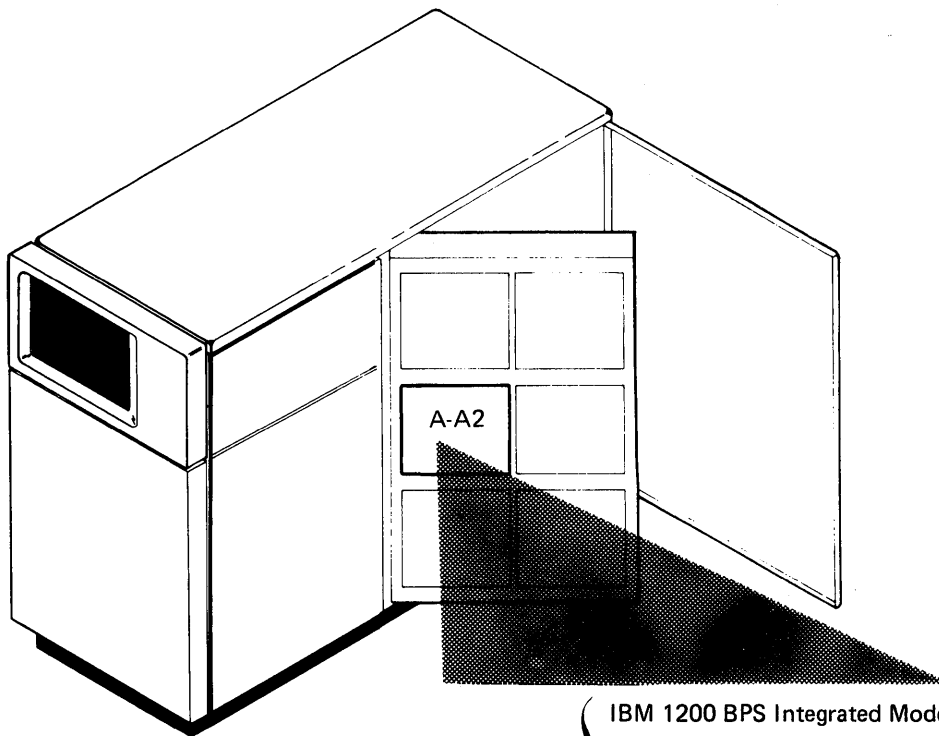
During transmit operations, each byte to be transmitted is sent to the communications adapter where the data is serialized and then sent one bit at a time to the modem or digital adapter. The modem or digital adapter, then sends the bits to the receiving terminal over the communications network.

During receive operations, the communications adapter receives each bit from the modem and assembles the bits into bytes (deserializes). Each byte of data is then sent to the processing unit.

31-100 LOCATIONS

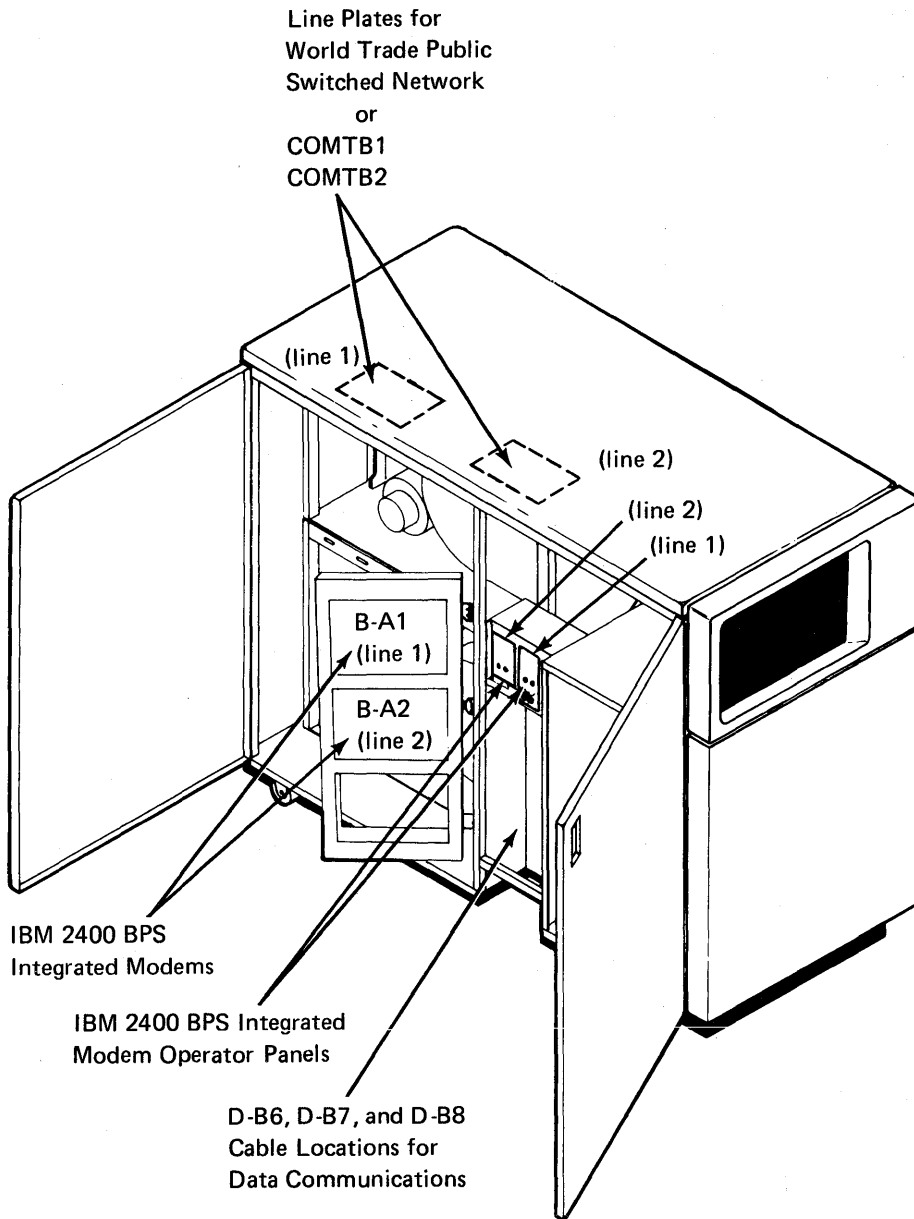
Figures 31-1 and 31-2 show the locations of the major parts used for data communications. The communications adapter cards are always in location A-A2J2 for line 1; and in location A-A2K2 for line 2. The internal clock card, when used, is always in location A-A2Q2 and supplies clock pulses for both line 1 and line 2. The internal clock is used when the modem does not supply an external clock.

Locations of other parts such as the integrated modems, external adapters, and external cables are shown in paragraphs 31-110 through 31-150.



- | | | |
|------------------|---|---|
| A-A2H2
Line 1 | } | IBM 1200 BPS Integrated Modem
or
Electronic Industries Association Adapter Card
or
Digital Data Service Adapter |
| A-A2H4
Line 2 | } | IBM 1200 BPS Integrated Modem
or
Electronic Industries Association Adapter Card
or
Digital Data Service Adapter |
| A-A2J2 | | Communications Adapter Card (Line 1) |
| A-A2K2 | | Communications Adapter Card (Line 2) |
| A-A2Q2 | | Internal Clock |

Figure 31-1. Data Communications Card Locations on A-Gate

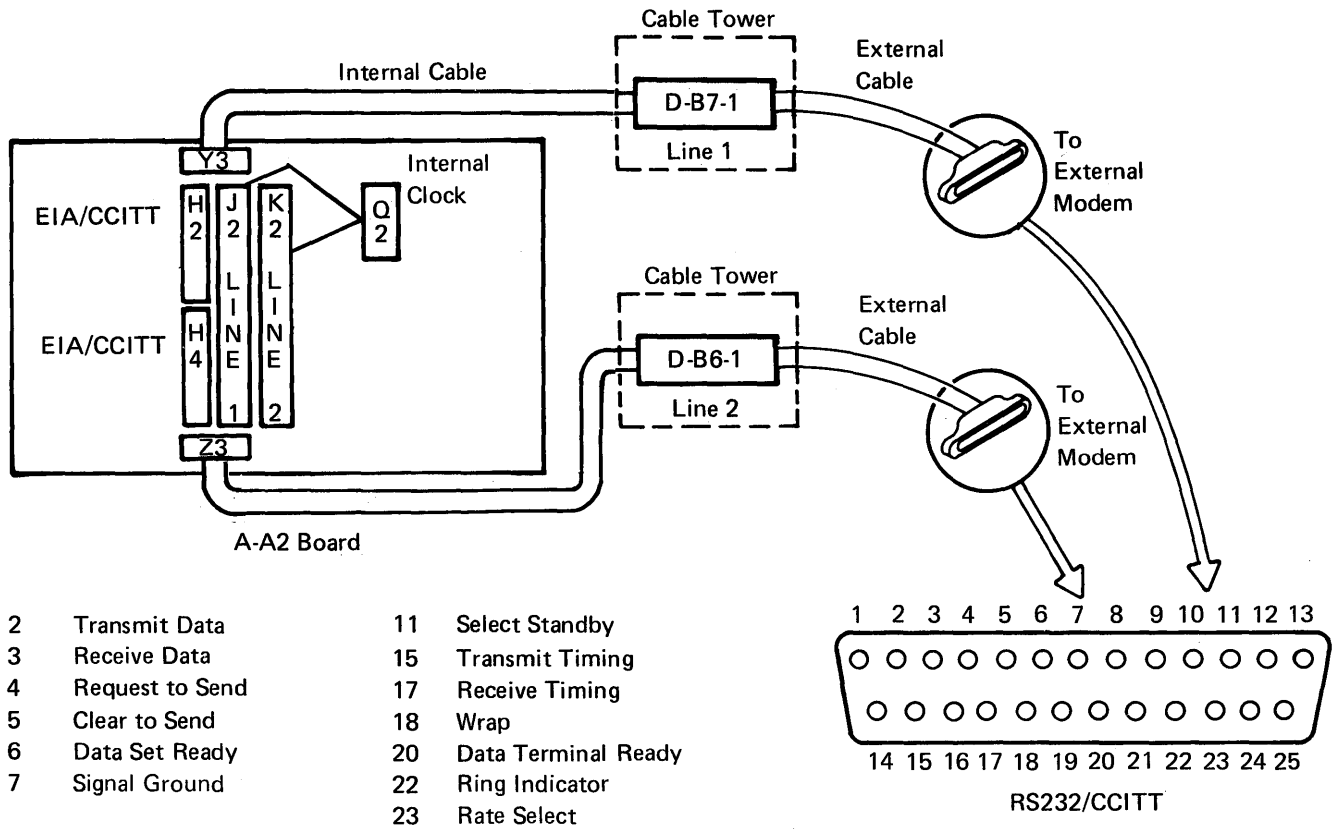


Note: See paragraphs 31-120, 31-150, and 31-320 for additional hardware description.

Figure 31-2. B-Gate and Cable Tower

31-110 EIA/CCITT

When external modems are attached to System/34, an EIA/CCITT (Electronic Industries Association/International Consultative Committee on Telegraphy and Telephony) adapter card is in card location A-A2H2 for line 1; and in card location A-A2H4 for line 2. Figure 31-3 shows all the parts for the external modem configuration.



1, 8, 9, 10, 12, 13, 14, 16, 19, 21, 24, and 25 are not used

Figure 31-3. Data Communications with EIA/CCITT

31-120 2400 BPS Integrated Modem

Because of different networks, there are different ways to attach the 2400-bps integrated modem to System/34. For line 1, the adapter card is always in A-A2J2 and the 2400-bps modem is always on the B-A1 board. The line 2 adapter card is always in A-A2K2 and the 2400-bps modem is always in the B-A2 board. The operator panels, needed for all configurations of the 2400-bps modem, are located on top of the cable tower. The panel on the right side is for line 1 operation, and if line 2 is installed, its operator panel will be located on the left side (see Figure 31-2).

The different configurations and cable locations for the 2400-bps integrated modems are shown in Figures 31-4 through 31-13.

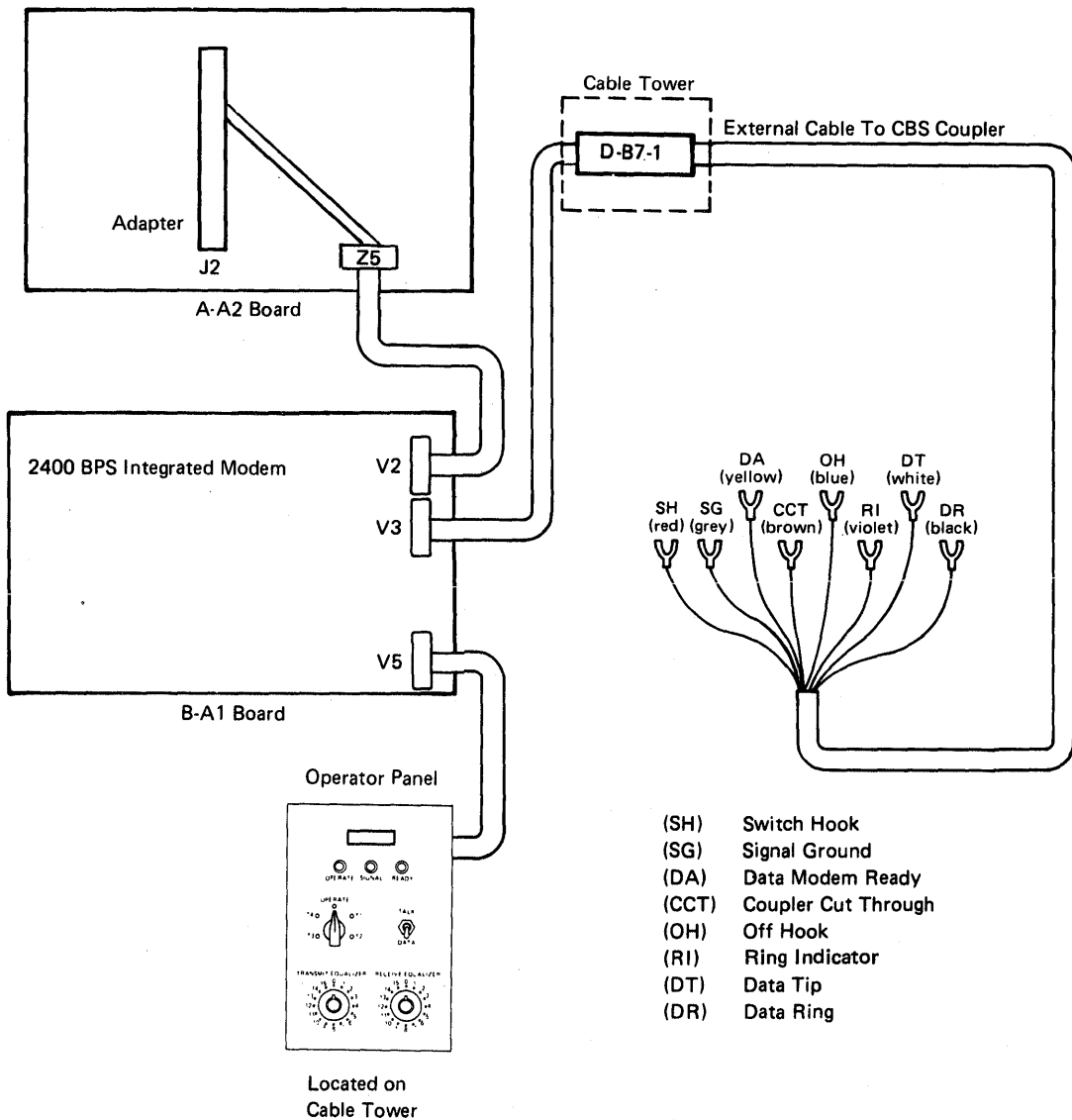


Figure 31-4. 2400 BPS Integrated Modem—Switched Network (Line 1)

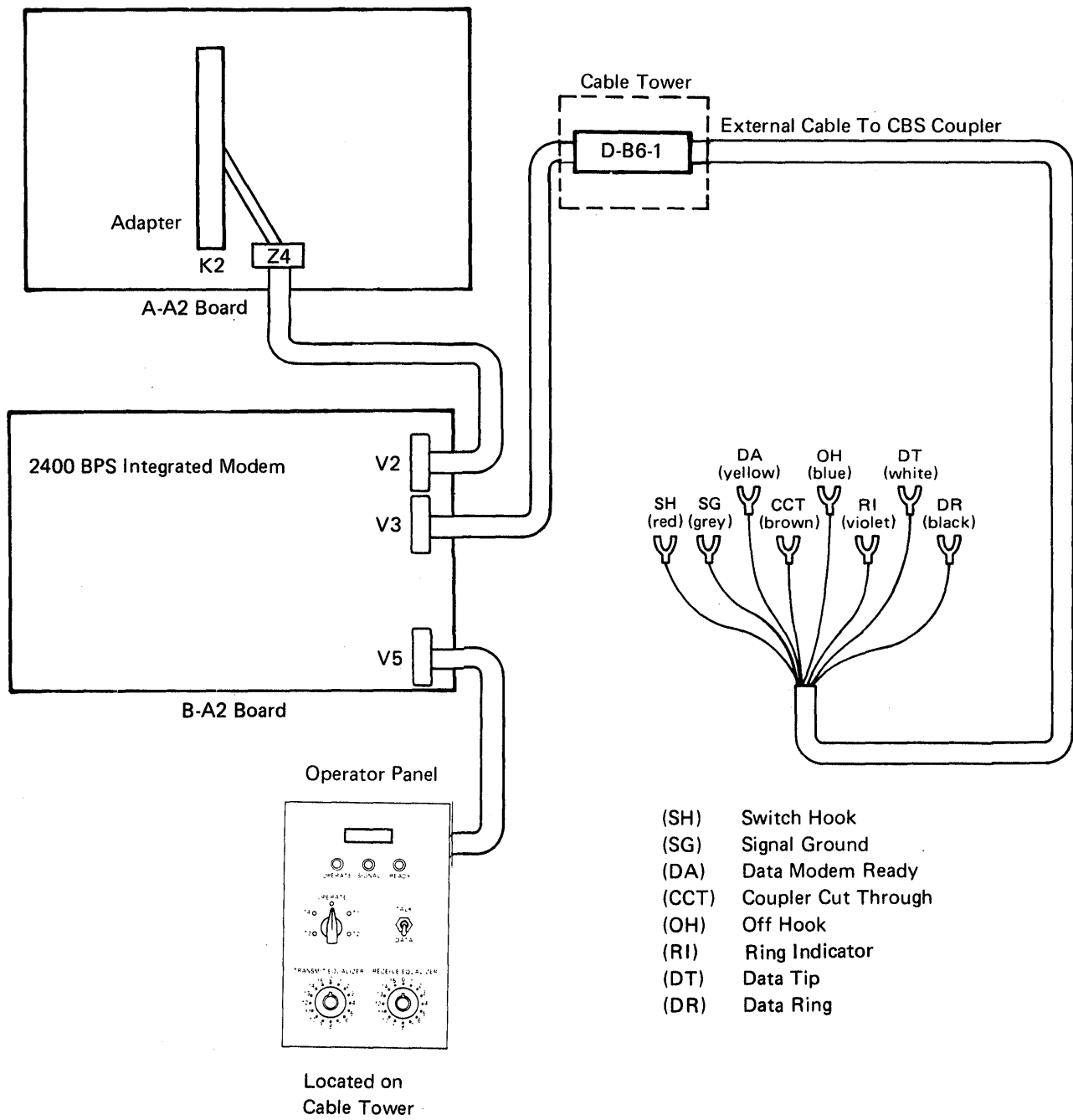


Figure 31-5. 2400 BPS Integrated Modem-Switched Network (Line 2)

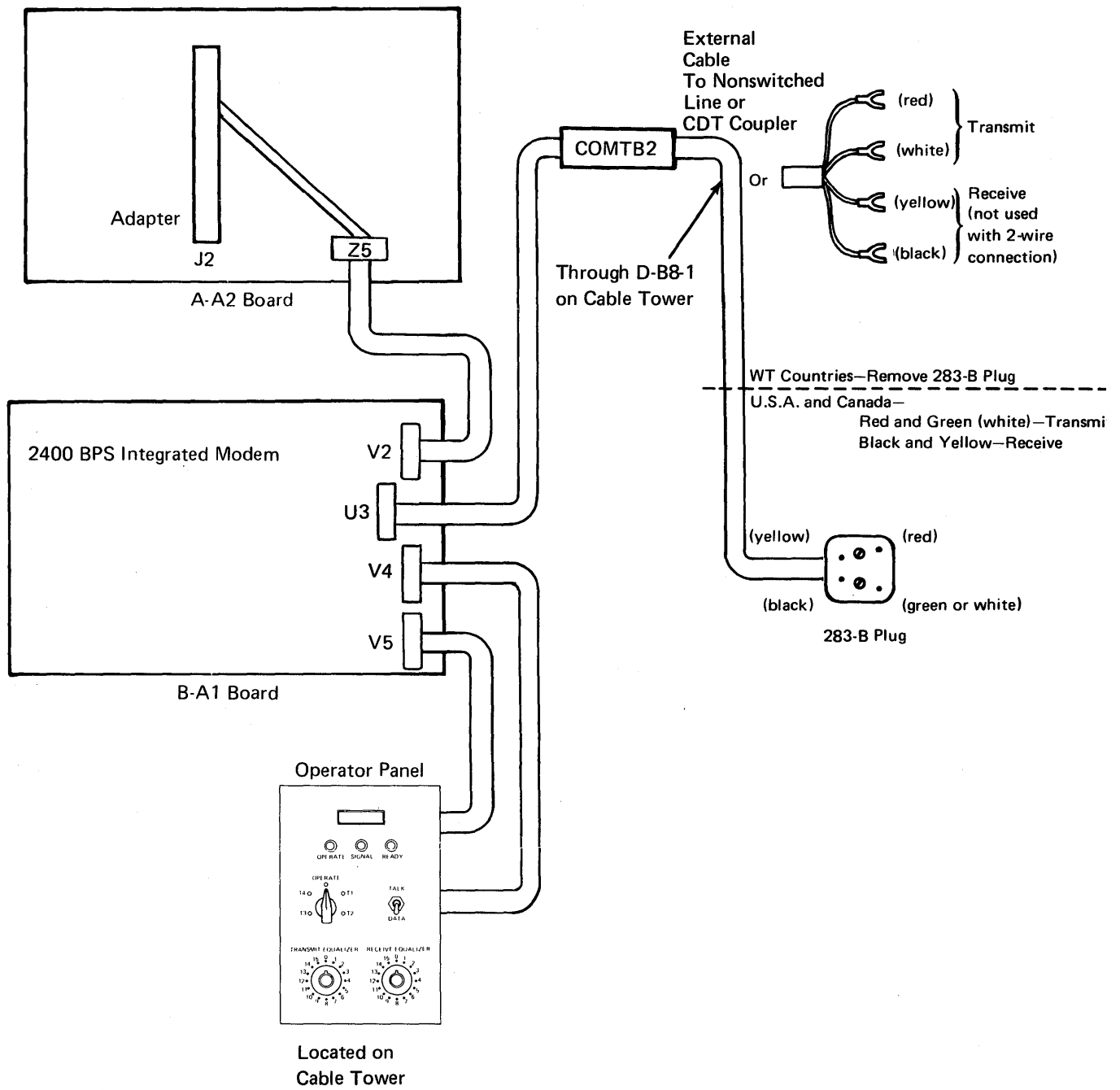


Figure 31-6. 2400 BPS Integrated Modem—Nonswitched Network (Line 1)

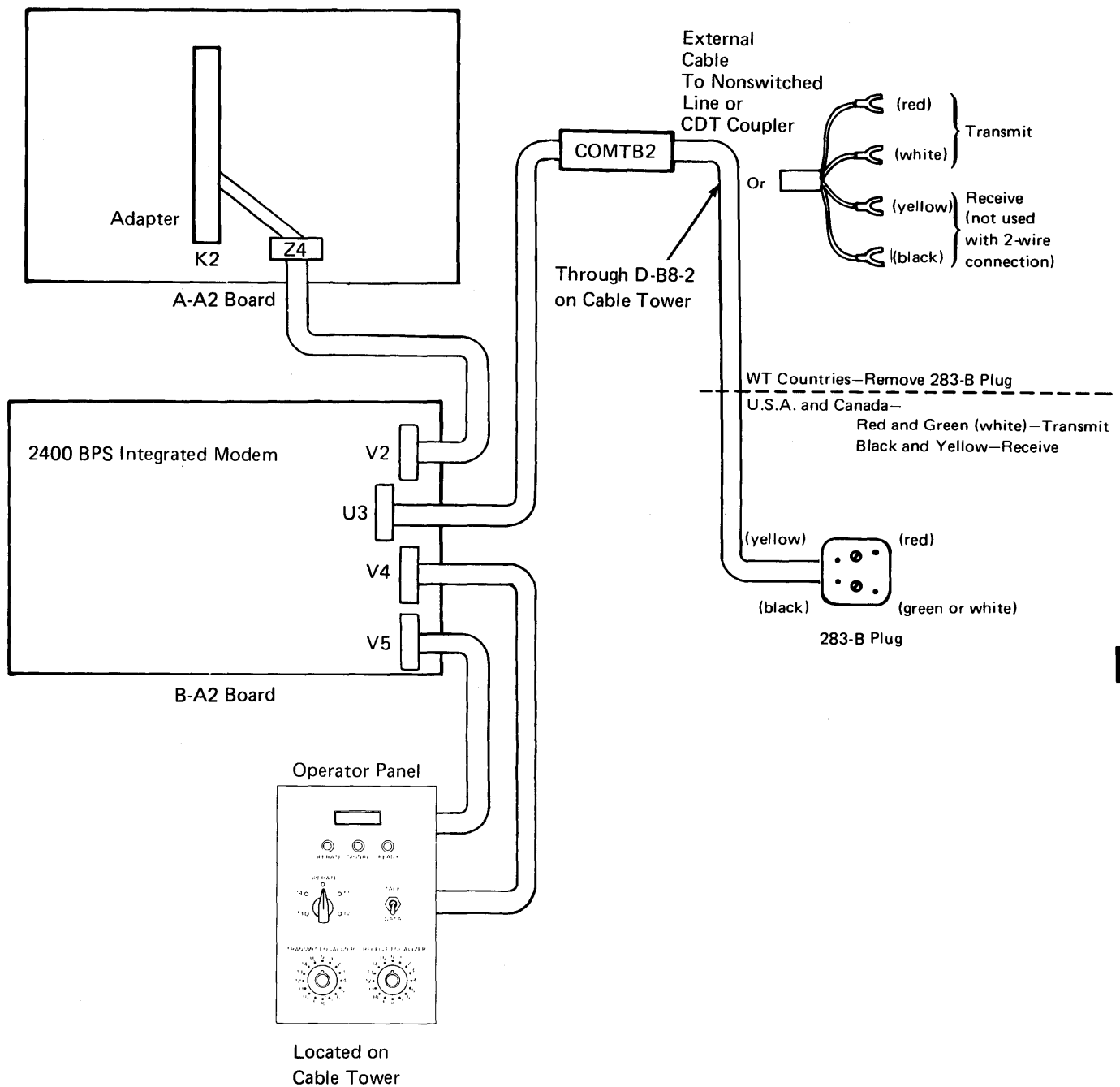


Figure 31-7. 2400 BPS Integrated Modem—Nonswitched Network (Line 2)

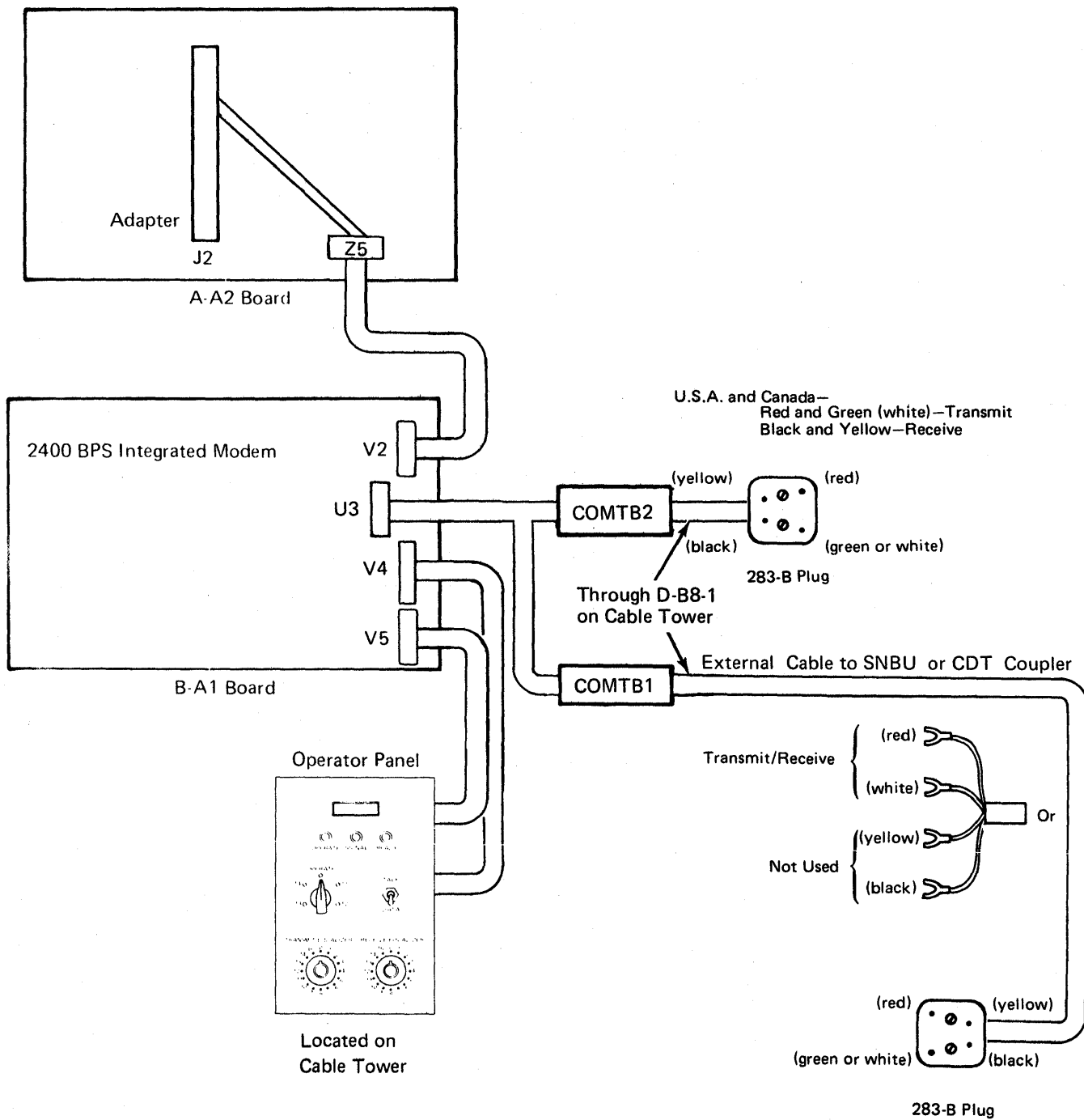


Figure 31-8. 2400 BPS Integrated Modem—Nonswitched Network with Manual SNBU (Line 1)

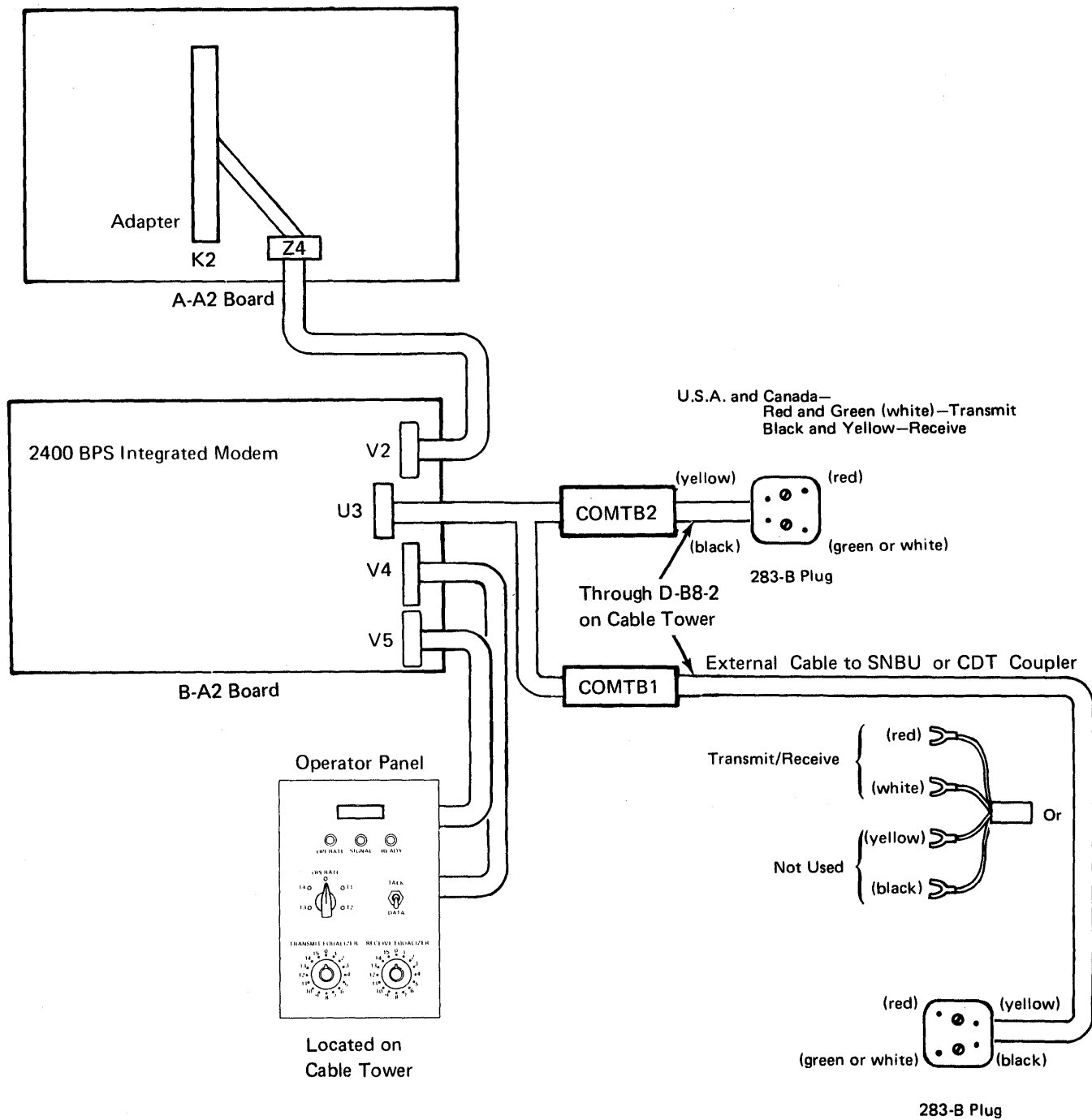


Figure 31-9. 2400 BPS Integrated Modem—Nonswitched Network with Manual SNBU (Line 2)

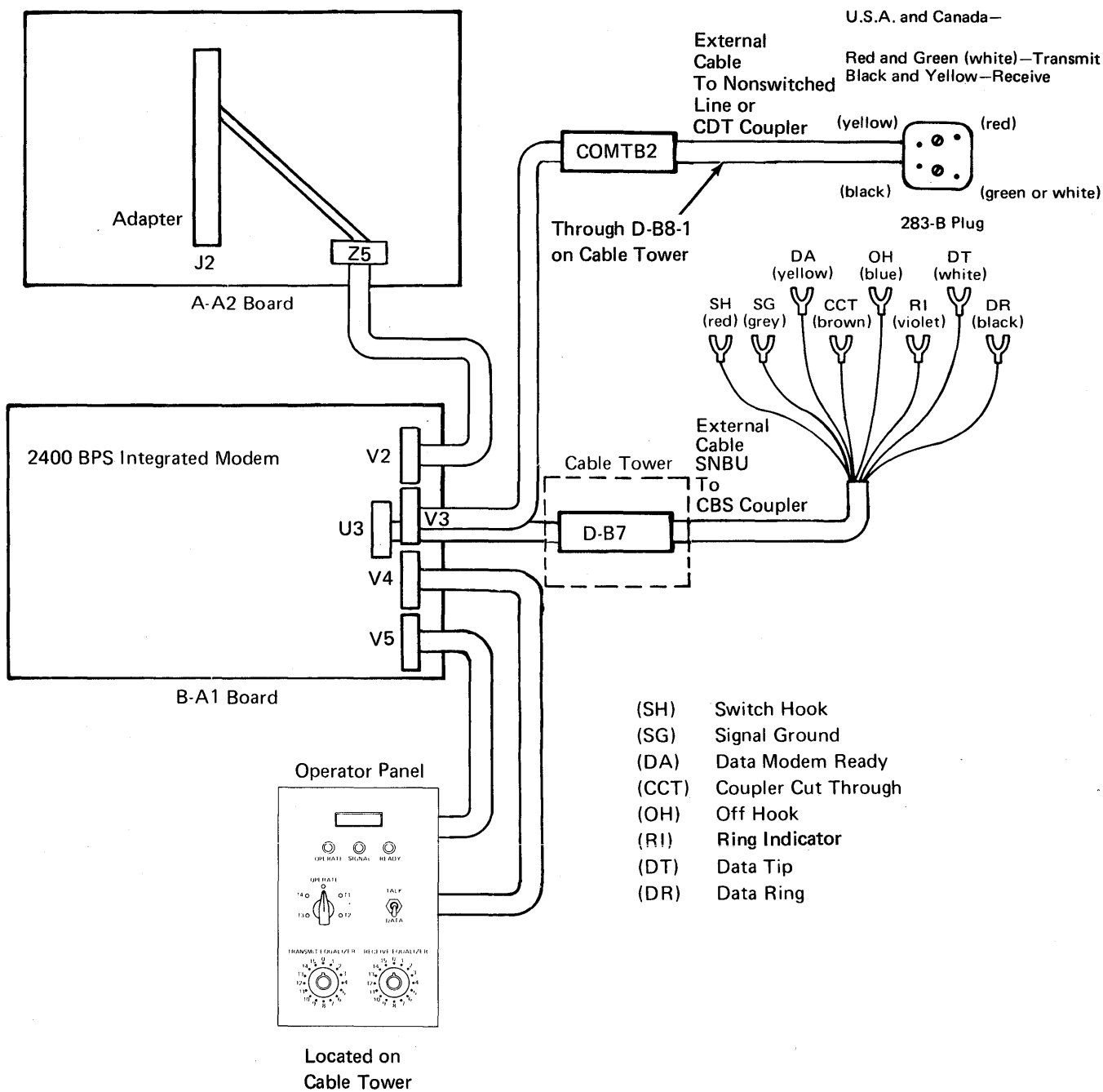


Figure 31-10. 2400 BPS Integrated Modem—Nonswitched Network with SNBU and Automatic Answering (Line 1)

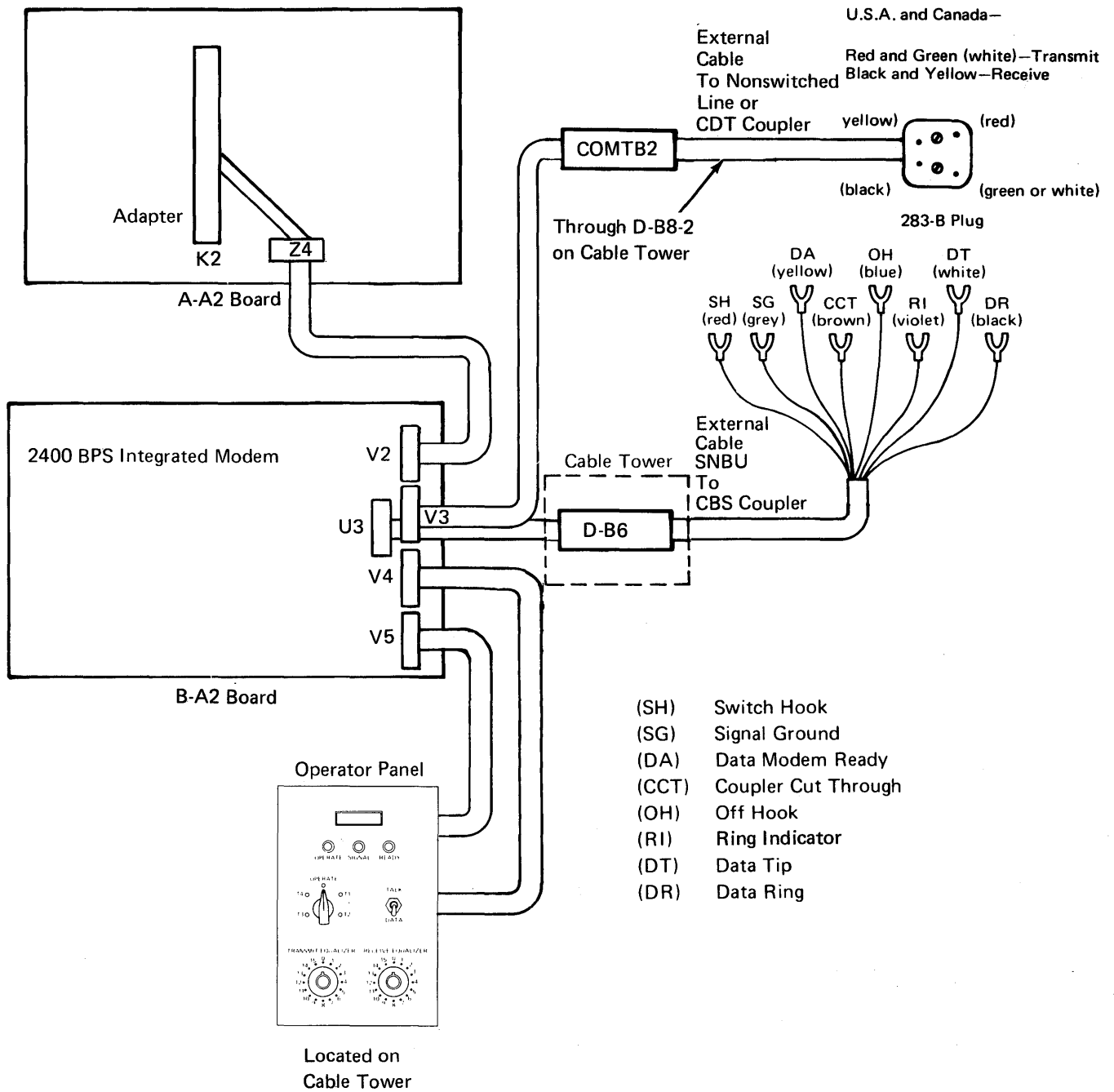


Figure 31-11. 2400 BPS Integrated Modem—Nonswitched Network with SNBU and Automatic Answering (Line 2)

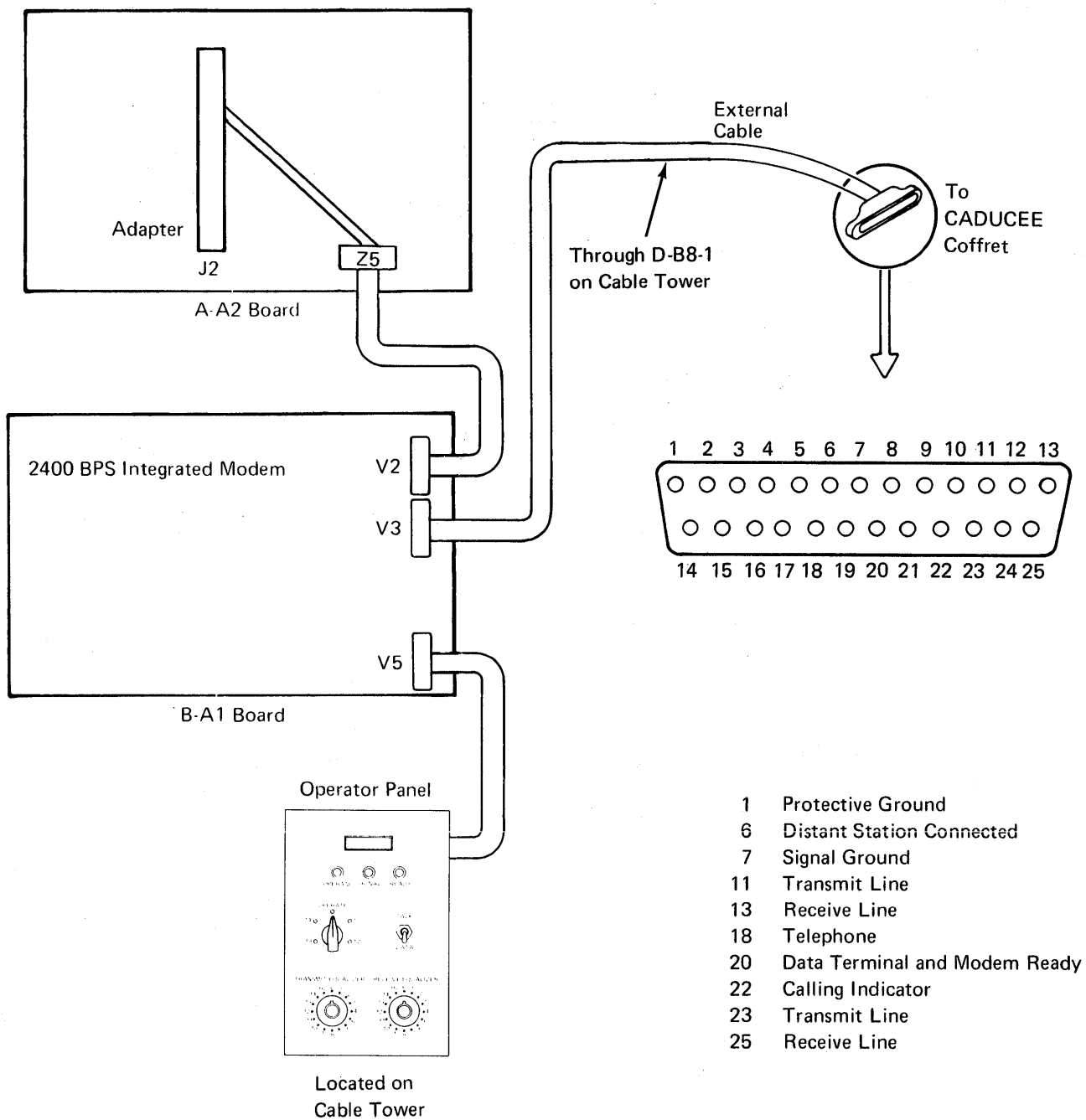


Figure 31-12. 2400 BPS Integrated Modem—CADUCEE (France Only)—Line 1

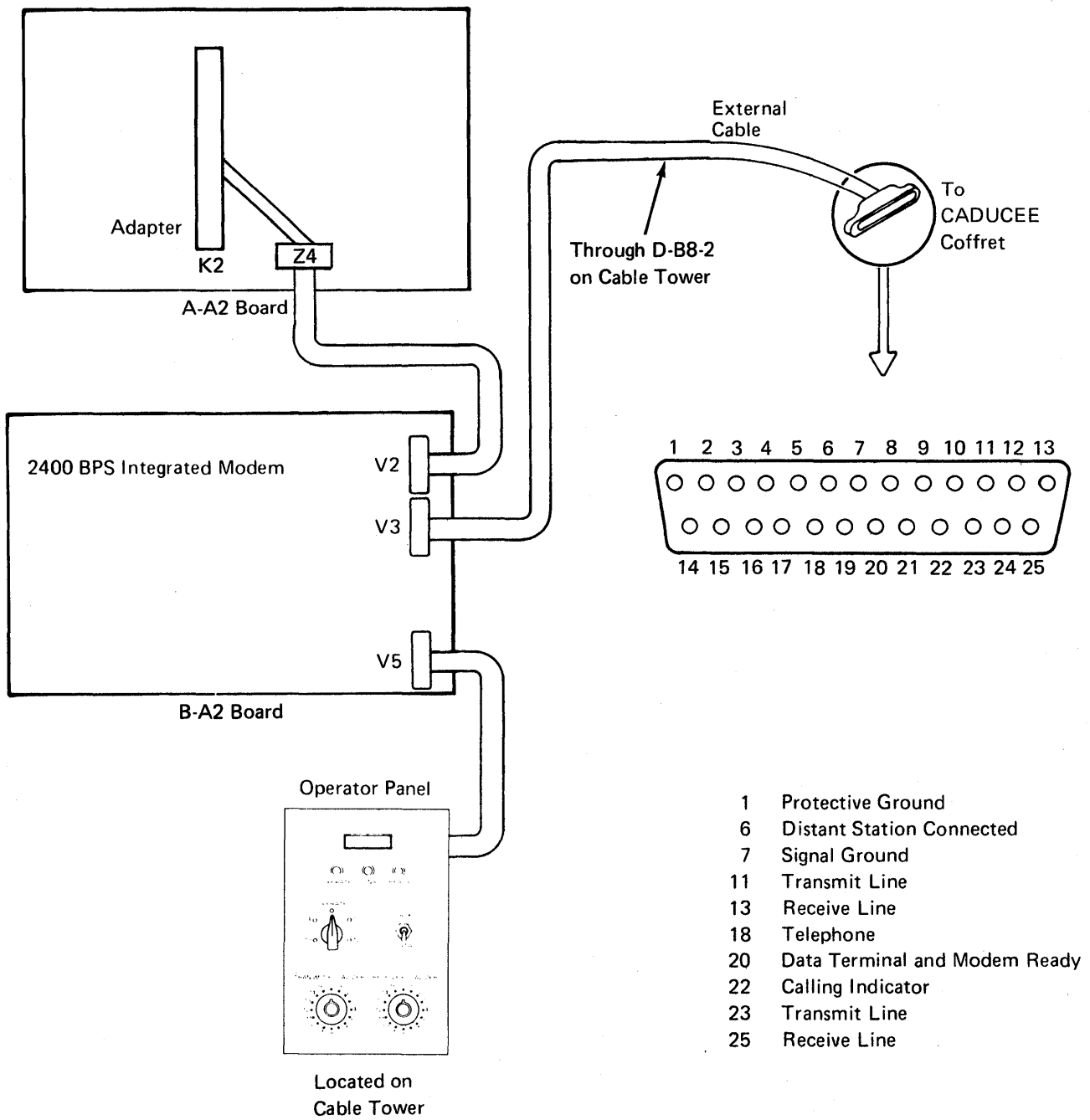


Figure 31-13. 2400 BPS Integrated Modem—CADUCEE (France Only)—Line 2

31-130 1200 BPS Integrated Modem

When the 1200-bps integrated modems are used, the location of the cards on the A-A2 board are the same; that is, the adapter cards are in J2 and K2; the 1200-bps modem cards are in H2 and H4. The differences, as shown in Figures 31-14 through 31-16, are that the internal cables are terminated at the cable tower (switched networks), the line plates (World Trade public switched networks), or at the terminal blocks (nonswitched networks).

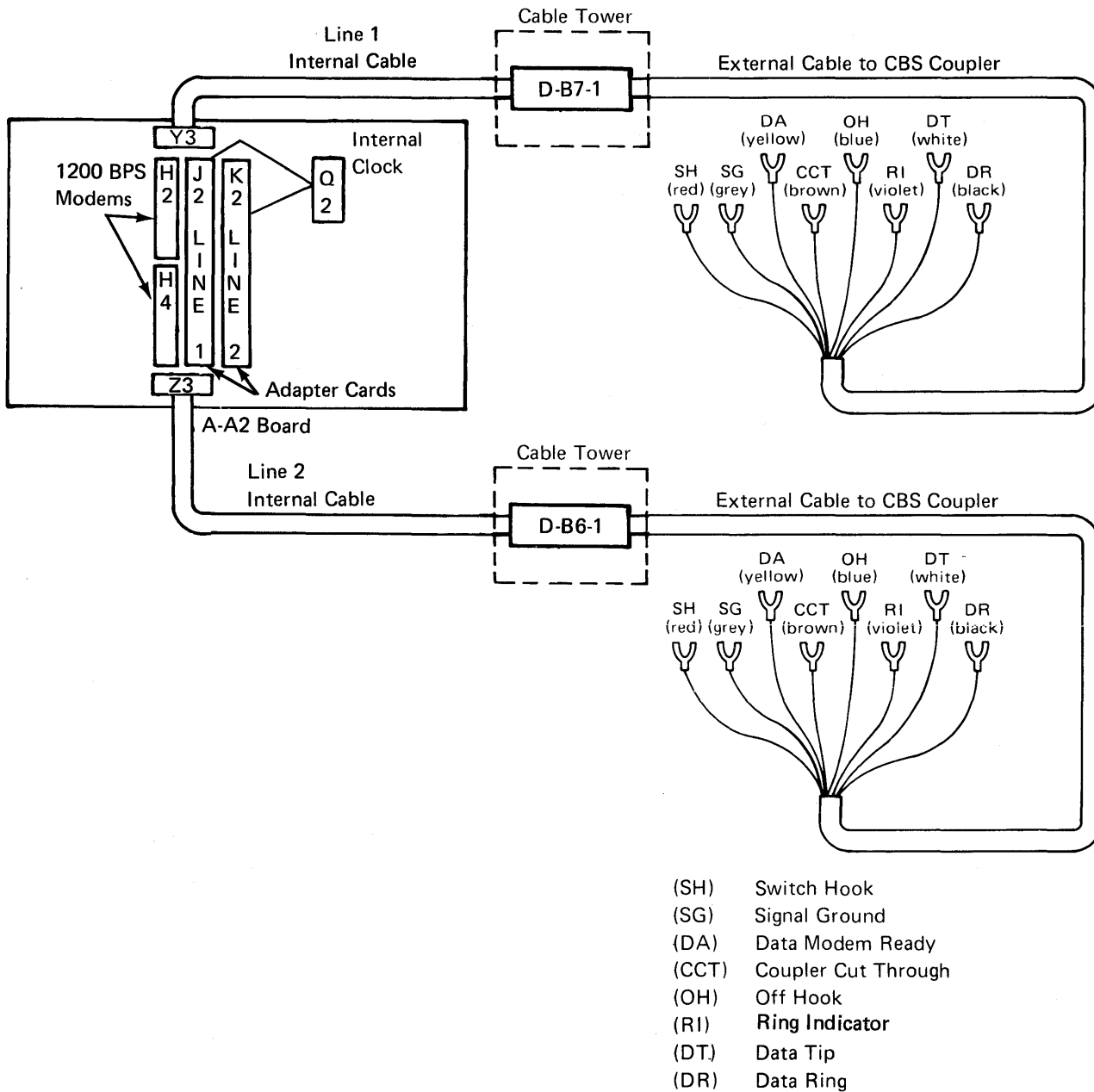


Figure 31-14. 1200 BPS Integrated Modem-Switched Network

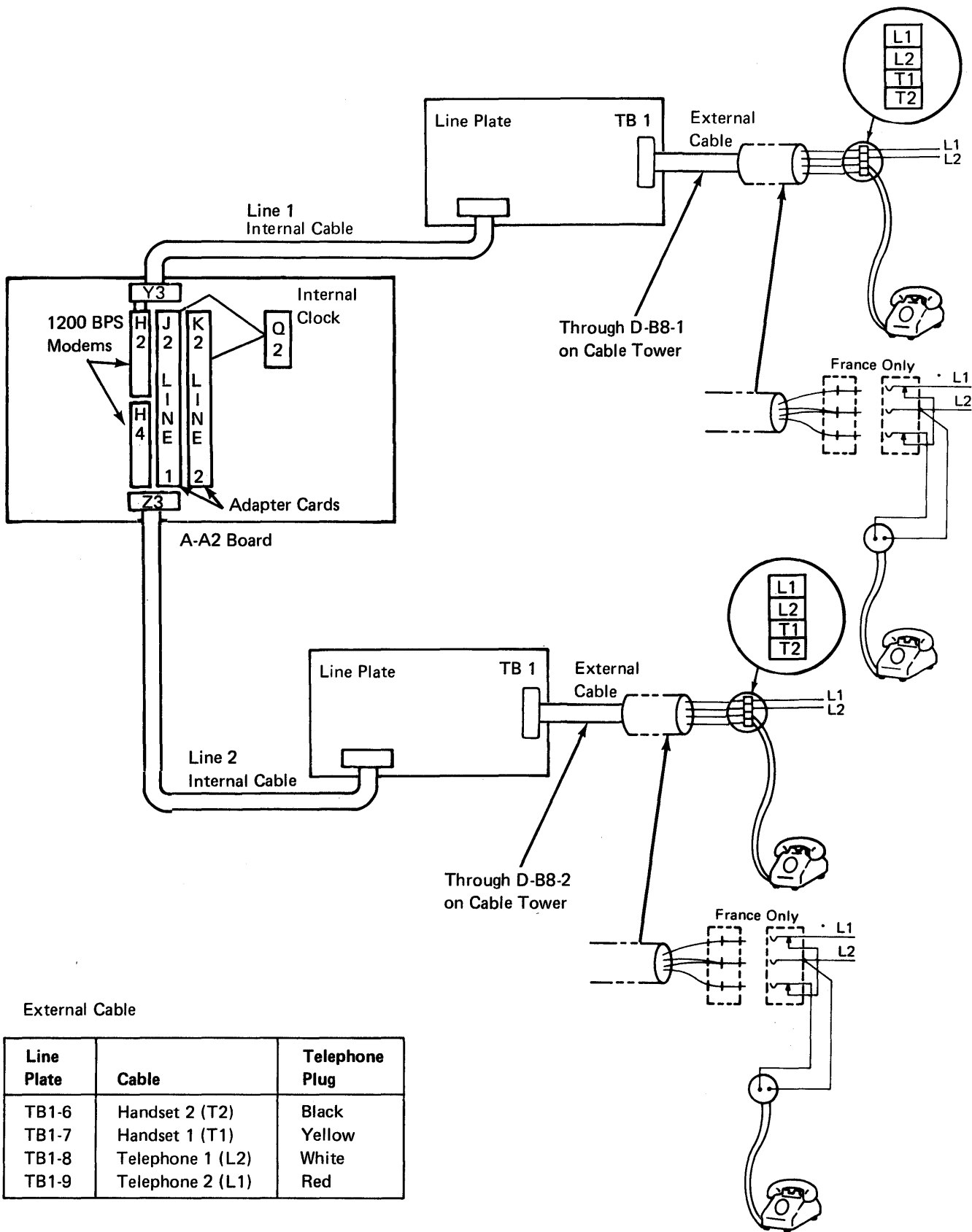


Figure 31-15. 1200 BPS Integrated Modem-World Trade Public Switched Network (PSN)

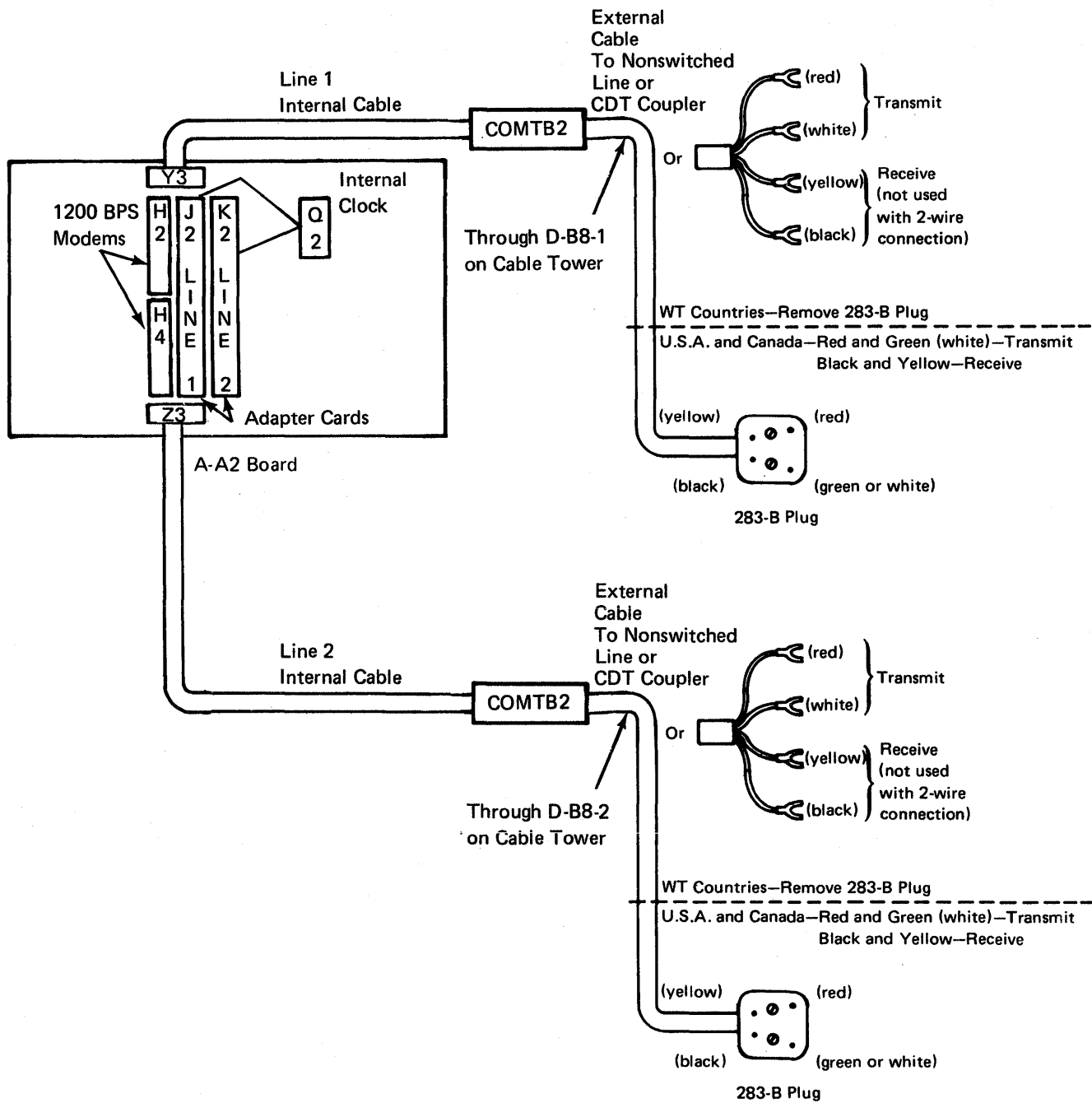


Figure 31-16. 1200 BPS Integrated Modem—Nonswitched Network

31-140 Digital Data Service Adapter

The Digital Data Service Adapter cards are located in A-A2H2 (line 1) and in A-A2H4 (line 2). The communications adapter cards are located in A-A2J2 (line 1) and in A-A2K2 (line 2). Figure 31-17 shows the parts needed for the Digital Data Service Adapter.

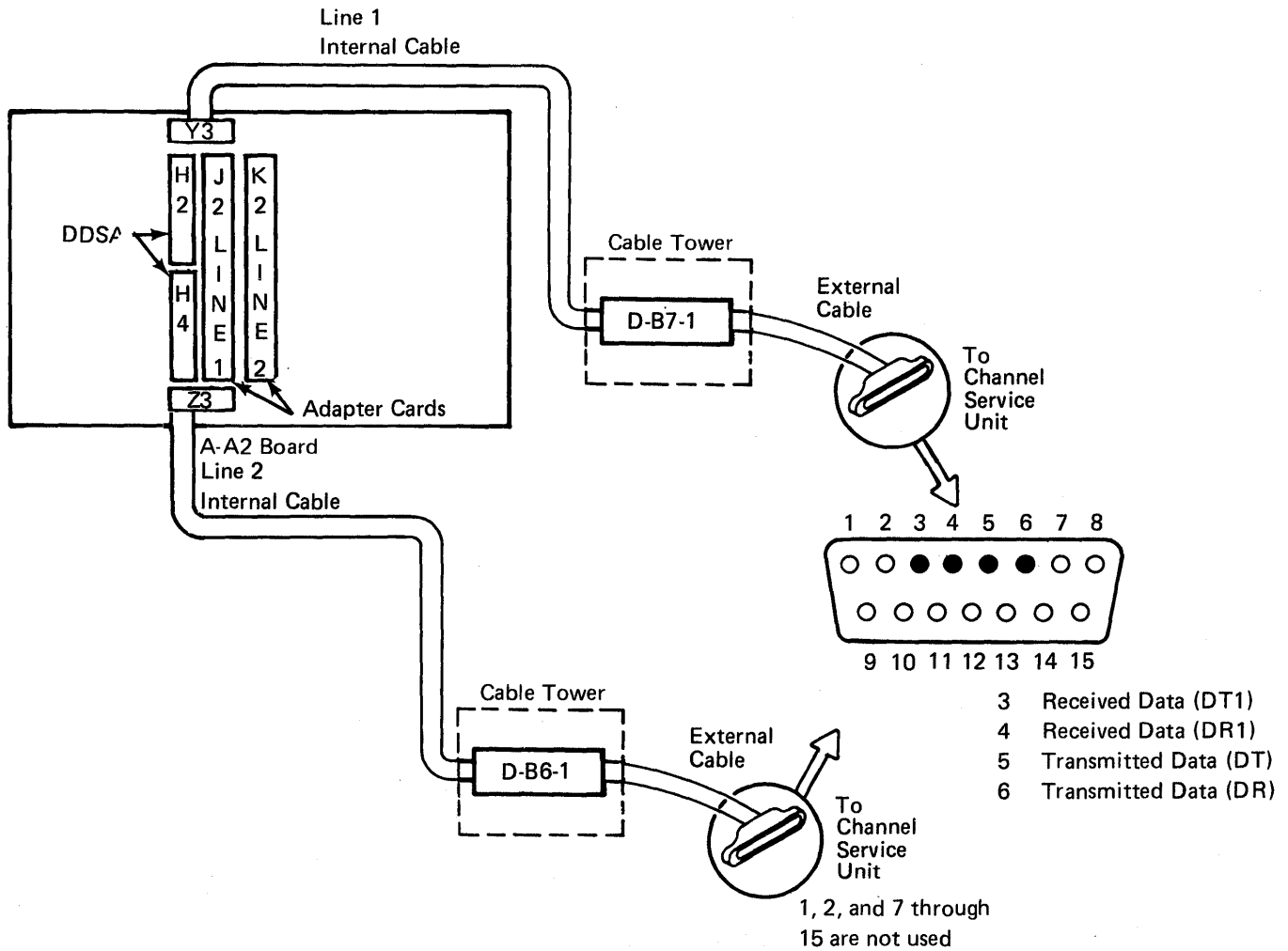


Figure 31-17. Data Communications with the Digital Data Service Adapter

31-150 External Cables

The locations of the external cables are shown in Figure 31-18. The cables that come through the plate in the D-B8 location are connected to either COMTB1, COMTB2, or the line plate (for World Trade). FSL pages FA592 and FA792 show the wiring for COMTB1 and COMTB2, and Figure 31-24 shows the wiring for the line plate.

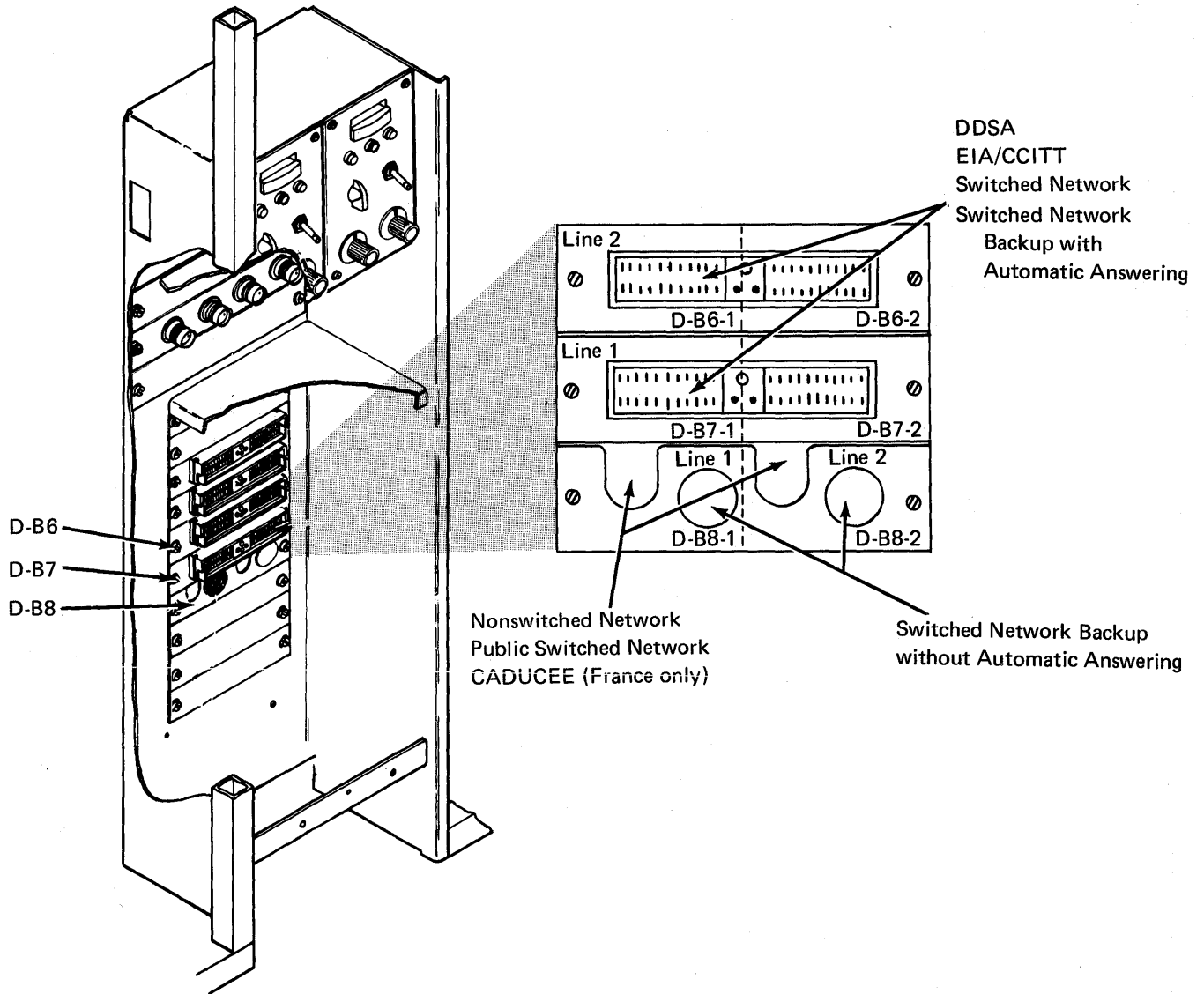
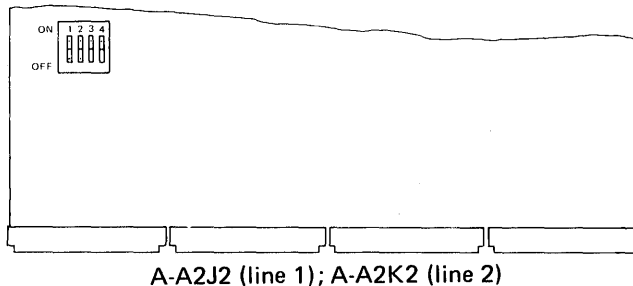


Figure 31-18. Cable Tower Locations for External Cables

31-200 ADAPTER CARD

The data communications adapter cards in A-A2J2 and A-A2K2 are the common interface between System/34 and all modems. Each card has four switches; set them as instructed in Figure 31-19.



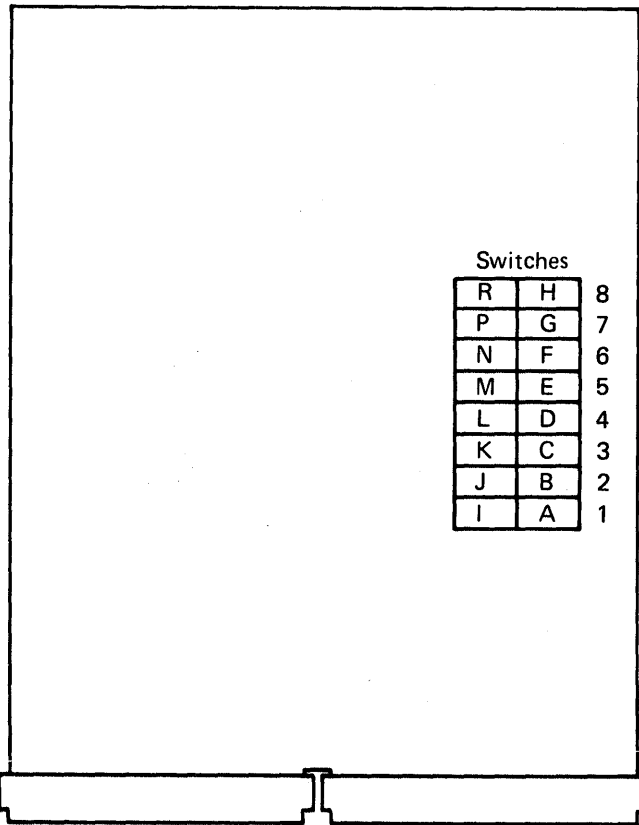
Switch	Condition	Meaning
1	On	Continuous carrier (the 'request to send' line is always on). <i>Note:</i> Set this switch off if continuous carrier is needed with the 2400 BPS modem with SNBU and attach a jumper from B-A1M2G02 to B-A1T2B09 (line 1), or jumper from B-A2M2G02 to B-A2T2B09 (line 2).
	Off	Not continuous carrier (set off for DDSA and for switched networks)
2	On	For EIA, 2400 BPS modem, and for enable rate select.
	Off	For DDSA, 1200 BPS modem, and for disable rate select.
3	On	Not NRZI coding
	Off	NRZI coding used <i>Note:</i> The customer can use BSC and/or SDLC on the same communication line. Therefore, the following information is important to the setting of the NRZI switch (switch 3) on the adapter card: <ul style="list-style-type: none"> • The NRZI switch setting must match the option chosen in the configuration for diagnostics to work correctly. • If the customer is operating with <i>only</i> BSC or with DDSA, select not NRZI (switch 3 is set on). • BSC microcode disables the NRZI function regardless of the switch setting. • Only SDLC uses NRZI but the selection of NRZI depends on the following: <ul style="list-style-type: none"> – If the customer is operating with SDLC (or with SDLC and with BSC on the same communication line), the switch setting and the configuration record must be set for SDLC operation. – The NRZI switch setting depends on the remote device and on the modem being used. For SDLC, all data terminal equipment communicating with each other must select the same coding option (NRZI or not NRZI). Contact your IBM marketing representative for identification of those modems that have pattern sensitive synchronization problems, and to determine which coding option should be used. When PTT mandatory modems are used in World Trade, refer to the <i>IBM World Trade Signal Converter Handbook, ZZ19-6066</i>. This manual will help determine which coding option should be used.
4	On	Device address and interrupt request bit. If only one communication line is installed on the system, set switch 4 on. If switch 4 is on, the device address 80 and the interrupt request bit 0 (bit 0 = DBI 0) are used by the adapter.
	Off	If switch 4 is off, the device address 20 and the interrupt request bit 2 (bit 2 = DBI 2) are used by the adapter.
		<i>Note:</i> If two communication lines are installed, one adapter must use address 80 (switch on) and the other adapter must use address 20 (switch off). If one of the lines operates at a speed greater than 4800 bps, it should use address 80 (switch on); the other line should use address 20 (switch off). If a 1255 is installed, always set line 1 to use address 80 (switch on).

Figure 31-19. Data Communications Adapter Card

31-300 1200 BPS INTEGRATED MODEM

31-310 Card Switch Settings

Because of different networks, the 1200-bps modem cards in A-A2H2 (line 1) and A-A2H4 (line 2) are one of four different cards. Each of these cards has at least 16 switches that must be set as described in Figures 31-20 through 31-23.



A-A2H2 (line 1); A-A2H4 (line 2)

Set switches J and K on and switches L, M, N, P, and R off. Set the transmit level switches A through I as shown in the table at right.

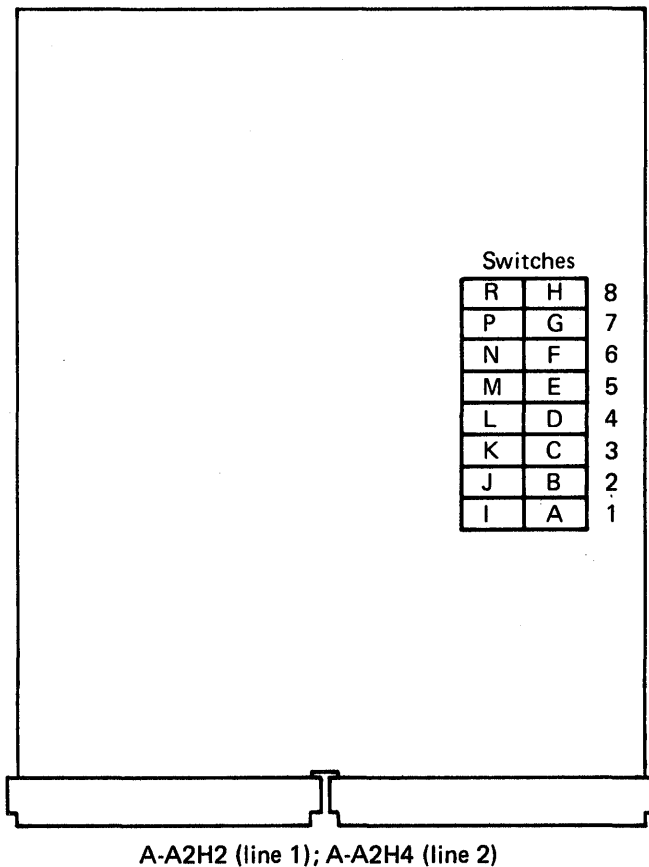
Note: Switches N and P are set off for a clear-to-send delay of 230 ms, and switch L is set off for an echo clamp delay of 150 ms.

Transmit Level

Set the transmit level to match the level specified on the CBS data coupler. A ● in the table below indicates that the switch must be on to make a selection. Set the switches to the needed transmit level.

Level in Decibels	Transmit Level Switches								
	A	B	C	D	E	F	G	H	I
0	●								
-1		●							
-2			●						
-3				●					
-4					●				
-5						●			
-6	●						●		
-7		●						●	
-8			●					●	
-9				●				●	
-10					●			●	
-11						●	●		
-12	●								●
-13		●							●
-14			●						●
-15				●					●
-16					●				●
-17						●			●
-18	●								●

Figure 31-20. Switch Settings for Switched Network



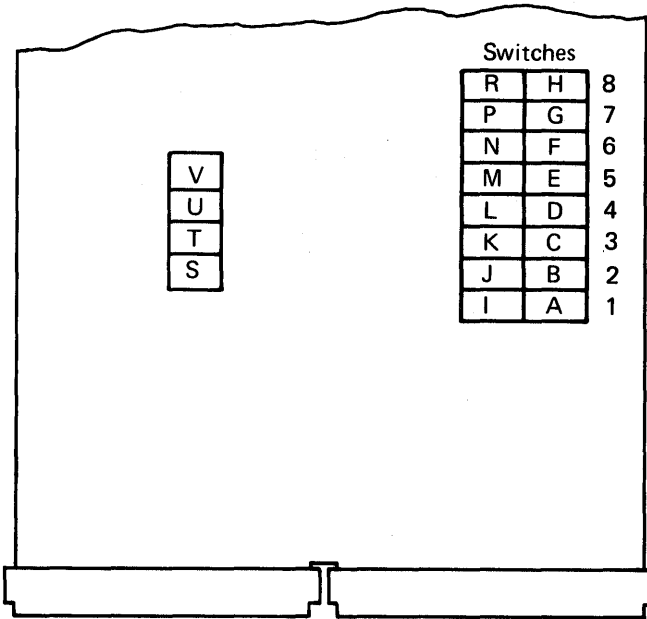
Set switches A through I, M, and R off. The remaining switches are set for:

- 4-wire nonswitched line (set J off and K on)
- 2-wire nonswitched line (set J on and K off)
 Also attach a jumper from A-A2H2G02 to A-A2H2G09 and a jumper from A-A2H2J05 to A-A2H2J13 (line 1); attach a jumper from A-A2H4G02 to A-A2H4G09 and a jumper from A-A2H4J05 to A-A2H4J13 (line 2).
- Clear-to-send delay of:
 - 30 ms; set N off and P on
 (recommended for a 4-wire nonswitched line)
 - 80 ms; set N on and P off
 (use only for a special short 2-wire nonswitched line)
 - 230 ms; set N and P off
 (recommended for a switched line or a 2-wire nonswitched line)

Note: The clear-to-send delay must always be longer than the echo clamp delay.

- Echo clamp delay of:
 - 0 ms; L can be set on or off because the 0 ms delay is automatically selected if the 30 ms clear-to-send delay is selected
 - 50 ms; set L on
 (nonswitched or switched line)
 - 150 ms; set L off
 (recommended for a switched line or a 2-wire nonswitched line)

Figure 31-21. Switch Settings for Nonswitched Network



A-A2H2 (line 1); A-A2H4 (line 2) .

Set switches N, S, T, U, and V on and switch P off.

Set the transmit level switches A through H and R as shown in the table at right.

The remaining switches are set for:

- 4-wire nonswitched line (set I on and M off)
 - 2-wire nonswitched line (set I off and M on)
- Also attach a jumper from A-A2H2G02 to A-A2H2G09 and a jumper from A-A2H2J05 to A-A2H2J13 (line 1); attach a jumper from A-A2H4G02 to A-A2H4G09 and a jumper from A-A2H4J05 to A-A2H4J13 (line 2).
- Clear-to-send delay of:
 - 30 ms; set K on and J off
(recommended for a 4-wire nonswitched line)
 - 80 ms; set K off and J on
(use only for a special short 2-wire nonswitched line)
 - 230 ms; set K and J off
(recommended for a switched line or a 2-wire nonswitched line)

Note: The clear-to-send delay must always be longer than the echo clamp delay.

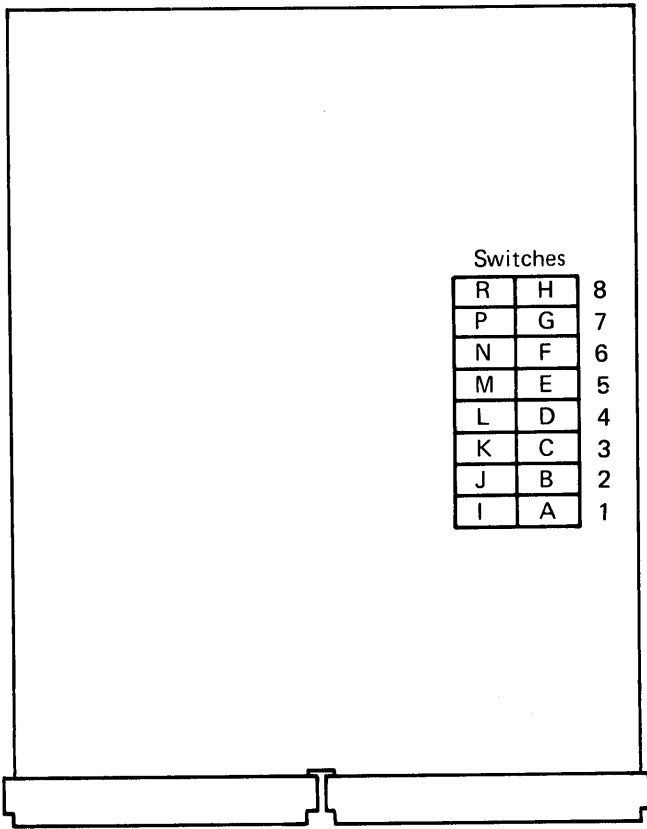
Transmit Level

A ● in the table below indicates that a switch must be on to make a selection. Set the switches to the needed transmit level.

Level in Decibels	Transmit Level Switches								
	A	B	C	D	E	F	G	H	R
0	●								
-1		●							
-2			●						
-3				●					
-4					●				
-5						●			
-6	●						●		
-7		●						●	
-8			●					●	
-9				●				●	
-10					●			●	
-11						●		●	
-12	●								●
-13		●							●
-14			●						●
-15				●					●
-16					●				●
-17						●			●
-18	●								●

- Echo clamp delay of:
 - 0 ms; L can be set on or off because the 0 ms delay is automatically selected if the 30 ms clear-to-send delay is selected.
 - 50 ms; set L on
(nonswitched or switched line)
 - 150 ms; set L off
(recommended for a switched line or a 2-wire nonswitched line)

Figure 31-22. Switch Settings for World Trade Nonswitched Network



Switches		
R	H	8
P	G	7
N	F	6
M	E	5
L	D	4
K	C	3
J	B	2
I	A	1

A-A2H2 (line 1); A-A2H4 (line 2)

Set switches I, J, K, N, P on and switches L and M off.
 Set the transmit level switches A through H and R as shown in the table at right.

Figure 31-23. Switch Settings for World Trade Public Switched Network (PSN)

Transmit Level

A ● in the table below indicates that the switch must be on to make a selection. Set the switches to the needed transmit level.

Level in Decibels	Transmit Level Switches								
	A	B	C	D	E	F	G	H	R
0	●								
-1		●							
-2			●						
-3				●					
-4					●				
-5						●			
-6	●						●		
-7		●						●	
-8			●					●	
-9				●				●	
-10					●			●	
-11						●	●		
-12	●								●
-13		●							●
-14			●						●
-15				●					●
-16					●				●
-17						●		●	
-18	●								●

31-320 Line Plate Adjustment

The line plate adjustment is needed only when the network is a World Trade public switched network (PSN).

The line plates are located under the top cover (see Figure 31-2). The one on the left side is for line 1, and the one on the right side is for line 2. The plates are shipped from the plant with a jumper between U10 and U11 (see Figure 31-24) which is the jumper location for the lowest direct current.

DANGER

Voltage is present on the line plate from the telephone lines.

To adjust the line plate:

1. For line 1, attach a jumper from A-A2H2B02 (the '-data terminal ready' line) to A-A2H2D08 (ground); for line 2, attach a jumper from A-A2H4B02 to A-A2H4D08. Attaching this jumper activates the relay on the line plate.
2. Connect a DC voltmeter across TP1 (+) and TP2 (-) on the line plate. See Figure 31-24 for the locations of TP1 and TP2.
3. Change the adjustment on the line plate by moving the jumper from U11-U10 to U10-U09, U09-U08, and so on until the voltage is in the range of 0.5 Vdc to 1.7 Vdc.
4. If the installation does not use a handset, jumper U2 to U3 on the line plate; if it does use a handset, jumper U1 to U2.
5. Remove the jumpers attached in step 1. The line plate is now adjusted.

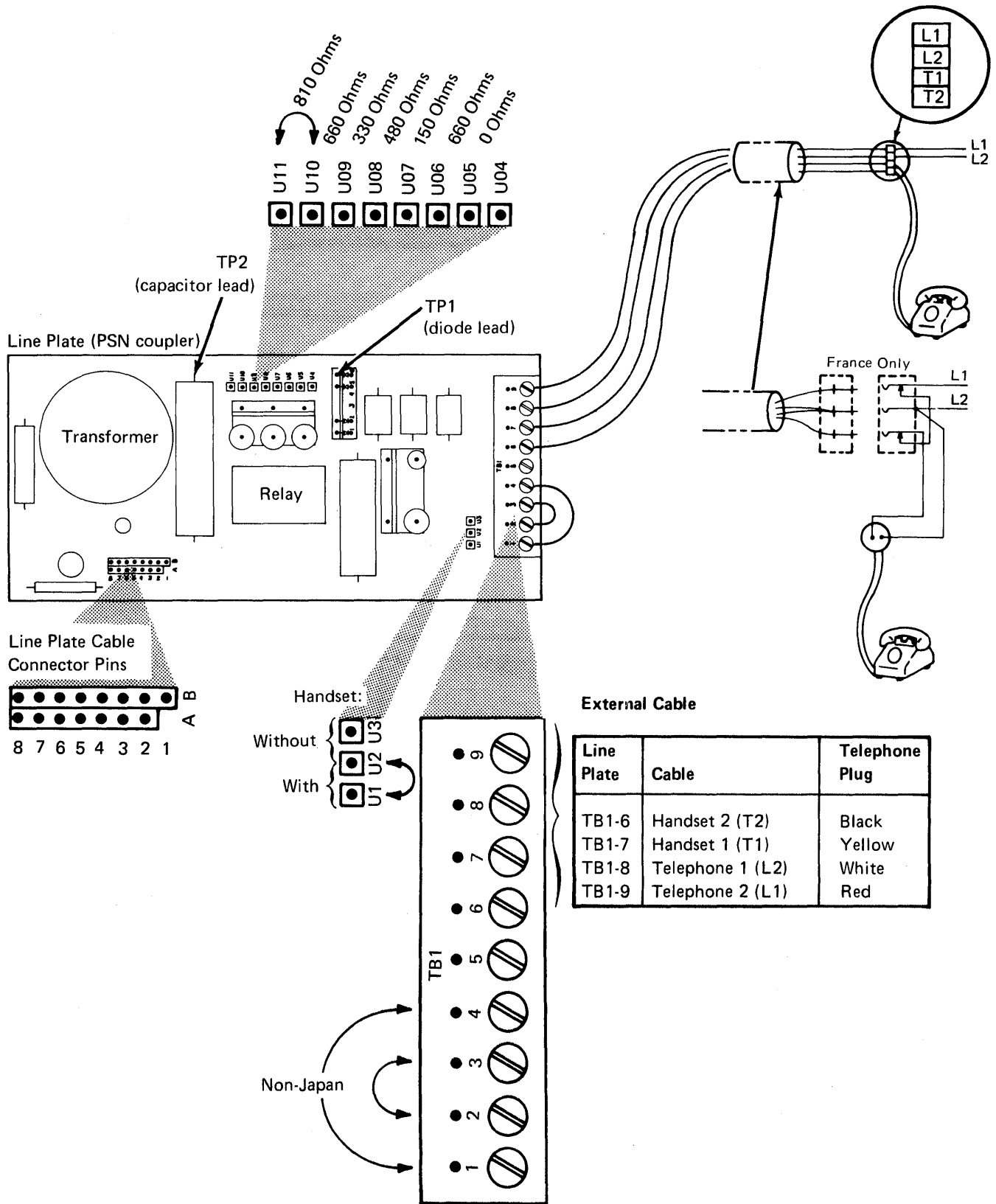


Figure 31-24. World Trade PSN Line Plate and Cable Connections

31-340 Transmit Level Limiting Check

The level control circuit of the CBS data coupler (or similar coupler) can be set to a lower signal level than the transmit level on the modem. When this is the case, overloading of the level control circuit causes slow recovery after change of direction, and a possible loss of the received signal. The modem transmit level must be decreased enough to prevent overloading the CBS coupler.

The following steps give the procedure to check transmit level limiting.

1. Connect a decibel meter across the DT (data tip) and DR (data ring) terminals of the modem at the CBS coupler interface. Set the meter to Bridging (no terminating resistance).
2. Set the Mode Selector switch to the Proc Run position (CE panel).
3. Set the Address/Data switches to 0000.
4. Set the MSIPL switch to the diskette position (CE panel).
5. Set the CSIPL switch to the diskette position (CE panel).
6. Set all other CE panel switches to their down positions.
7. Insert diskette DIAGB1.
8. Press the Load switch (operator panel).
9. Select the data communications exerciser test (transmit test).
10. Select 16 or 32 as data to be transmitted. Select the Scope Loop A Cmnd as the test run option.
11. If this is a new installation, dial the system from a local telephone. If you are troubleshooting a problem, have your system dialed from the remote system. Leave the telephone handset off the cradle (off the hook).
12. Observe the meter. The transmit signal level meter reading should equal the level of the coupler ± 1 dB. If the reading decreases in less than three seconds, the coupler is limiting the transmit level. If the reading remains constant, that level is being transmitted to the line.
13. If the coupler is limiting the transmit signal level, adjust the transmit level switches on the modem card until the transmit level is below the controlled level in the coupler. (Limiting no longer takes place.) The correct level is one decibel below the lower level reading in step 12. Stop here if this is a new installation.
14. Check to see that another modem receives a suitable signal level when this modem transmits by doing the following:
 - a. Have another person at the remote station connect a decibel meter across the DT (data tip) and DR (data ring) terminals of the modem at the CBS coupler interface.
 - b. Ensure the meter is set to Bridging (no terminating resistance).
 - c. Observe the meter. The receive level at the remote station should be 16 dB less than the transmit level. However, an acceptable level could be from -31 dB up to the same level as the transmit level.

31-400 2400 BPS INTEGRATED MODEM

The 2400-bps integrated modems are located on the B-A1 board (line 1), and on the B-A2 board (line 2). The operator panels are located at the top of the cable tower (see Figure 31-2).

31-410 Operator Panel

The following paragraphs describe the indicators and switches located on the 2400-bps operator panel (see Figure 31-25).

Operate Light

When the Test/Operate switch is set to Operate, the Operate light is on for a received mark signal and off for a received space signal.

When the Test/Operate switch is set to T1, T3, or T4, the Operate light turns off for 150 milliseconds when an error (space) occurs.

Signal Light

When the Test/Operate switch is set to Operate, the Signal light turns on when the 'data carrier detect' interface line is active. When the Test/Operate switch is set to T3, this light is off when the modem is not receiving a signal.

Ready Light

When the Test/Operate switch is set to Operate, the Ready light turns on when the 'data set ready' interface line is active. When the Test/Operate switch is set to any test position (T1 through T4), this light is off to inform the operator that the modem is not ready for normal operation.

Talk/Data Switch

This switch is normally set to Data for all operations but is set to Talk when the DAA (data access arrangement) handset is used. On Talk, automatic answering is inhibited and the modem ignores the 'data terminal ready' interface line.

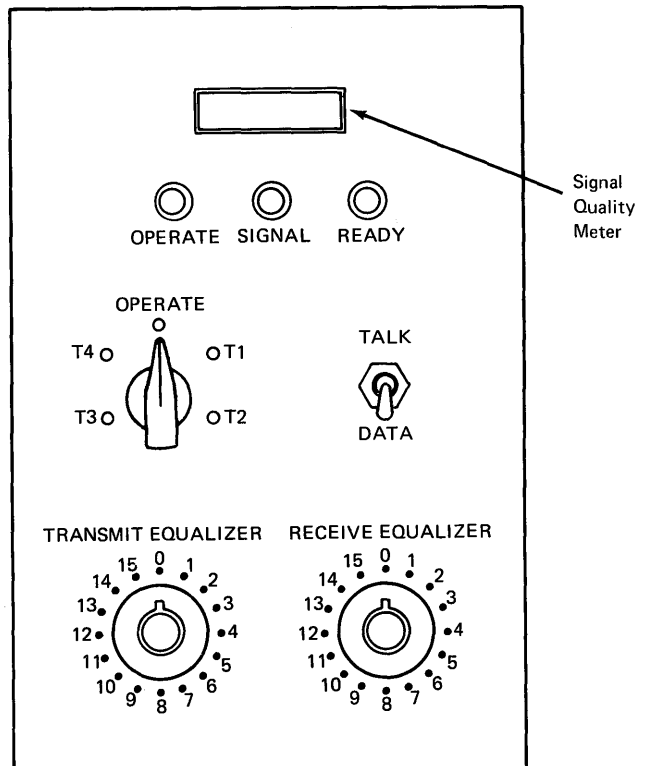


Figure 31-25. Operator Panel for 2400 BPS Modem

Signal Quality Meter

This meter indicates signal quality by a relative reading. The meter is used at installation time to adjust the transmit and receive equalizer switches.

Transmit Equalizer and Receive Equalizer Switches

These are the two equalizer switches for a leased line modem; they are adjusted at installation time by the customer engineer, or they are adjusted by the customer if a change is made to a different leased line. The installation instructions in this manual give the adjustment procedure for these two switches. A point-to-point modem has a receive equalizer only but a multipoint tributary modem has transmit and receive equalizers.

Test/Operate Switch

This switch is normally set to Operate but is set to one of the test positions (T1 through T4) for problem determination. The following paragraphs describe each test position of the Test/Operate switch and Figure 31-26 gives the meaning of each indicator for each position of the Test/Operate switch.

Test 1 (T1, Local Loop)

In this test, the transmit data is internally held to a mark level and the scramble pattern is transmitted. The line drive is internally connected to the receive preamplifier and the transmit pattern is demodulated and descrambled. The result is a constant mark, shown by the Operate light remaining on constantly. If a space occurs (failure), the Operate light turns off for 150 milliseconds.

Test 2 (T2, Local Loop)

This test loops the modem transmit function to the receive function with the data terminal equipment (DTE) controlling the modem interface. Data must be sent and checked by the DTE. The function of the DTE interface test line '-DS wrap interface' is the same as that of the test 2 function.

Test 3 (T3, Transmit)

This is a communications channel test, and should be used only if the local loop test (test 1) was correct. Transmit data is internally held to a mark level and the scramble pattern is transmitted. The remote receiving modem descrambles the data and should generate a constant mark (see test 4).

Test 4 (T4, Receive, Remote Loop)

This is a communications channel test, and should be used only if the local loop test (test 1) was correct. The signal received from the remote modem on test 3 is demodulated and descrambled, and should generate a constant mark. If a space occurs, the Operate light turns off for 150 milliseconds.

A duplex modem on test 4 rescrambles and transmits the data again if the remote loop function from the transmitting modem is available. The transmitting modem (remote from the modem on test 4) can be set on T3 or can be set on Operate with the DTE sending marks; sending spaces indicates errors at the receiving modem.

Note: The DTE interface of the modem is held off by T1, T3, and T4. There is no communication between the DTE and the modem when the interface is held off.

CADUCEE Feature (France only)

The CADUCEE is used only in France. A compromise equalizer is part of the CADUCEE attachment feature. It is disabled in T1, T2, or DTE test operation; it is active in T3 or T4 operation (except at 1200 bps).

Test Operate Switch Positions	Ready Light (On when 'data set ready' is active) (Note 1)	Signal Light (On when 'carrier detect' internal is active)	Operate Light (On for 'receive data' mark)	Signal Quality Meter (Note 2)
Operate	On (Note 3)	On when the receiving signal is above the threshold	On or flickering	0-50
Reset (intermediate positions)	Off	On when the receiving signal is above the threshold	On	0
T1	Off	On (wrap signal)	On (Note 4)	0 ₊
T2 (or DTE interface 'test' line)	Off (Note 1)	On if the 'request to send' line is active (wrap signal)	Depends on data; off for space, on for mark	0 ₊
T3 (2-wire system with remote modem on T4)	Off	Off	On	0
T3 (4-wire system with remote modem on T3 or T4)	Off	On (remote signal)	On (Note 4)	0-50
T4 (remote modem on T3)	Off	On (remote signal)	On (Note 4)	0-50

31

Notes:

1. The 'data set ready' line is active in T2 mode, but the Ready light is off. The DTE interface 'test' line which performs the same function as T2 does not inhibit the Ready light.
2. The signal quality meter should read 0 when the Signal light is off.
3. The Ready light blinks on and off.
4. The scramble pattern is being transmitted with input data clamped to mark. Therefore, the unscrambled data should be a steady mark and the Operate light should be on steady. Test circuits provide a 150 ms off period if even a single space is received so that the erroneous space can be observed.

Figure 31-26. Light Meanings for Test/Operate Switch Positions

31-414 Test/Operate Diagnostics

The modem lines controlled by the Test/Operate switch are shown in Figure 31-27. See this figure to verify correct operation of the modem by checking each position of the Test/Operate switch. If a failure occurs, see the FSL pages shown in Figure 31-27 as an aid in locating the source of the failure.

FSL Page	Line 1	FA716	FA716	FA707	FA707	FA707	FA716	FA707	FA707	FA716
	Line 2	FA797	FA797	FA797	FA797	FA797	FA797	FA797	FA797	FA797
Signal Name		-Request To Send Test OP	-Transmit Send Data	-2 Wire	-Wrap Relay	+Equal Out	+Clamp Interface	+Ready AEL	-Force DTR Off	-Force DTR On
Pin	Line 1	B-A1Q4G09	B-A1Q4J06	B-A1K4D09	B-A1K4B09	B-A1K4G07	B-A1Q4D09	B-A1K4D13	B-A1K4B13	B-A1Q4D13
	Line 2	B-A2Q4G09	B-A2Q4J06	B-A2K4D09	B-A2K4B09	B-A2K4G07	B-A2Q4D09	B-A2K4D13	B-A2K4B13	B-A2Q4D13
On/Active (Vdc)		0 to .3v	0 to .3v	0 to .3v	0 to .3v	4.8v to 6.4v	6.0v to 8.1v	6.9v to 9.4v	0 to .3v	0 to .3v
Off/Inactive (Vdc)		5.7v to 7.8v	5.7v to 7.8v	6.9v to 9.4v	10v to 13.2v	0 to .3v	0 to .3v	0 to .3v	10v to 13.2v	10v to 13.2v
Test/Operate Switch Position	Operate	Note 1	Note 2	Note 4	Off	Off	Off	Note 4	Note 4	Off
	Between Operate and T1	Off	Off	Note 4	Off	Off	On	Off	On	Off
	T1	On	Off	Off for 4 wire	On	On	On	Note 4	On	Off
	Between T1 and T2	Off	Off	Note 4	Off	Off	On	Off	On	Off
	T2	Note 1	Note 2	Off for 4 wire	On	On	Off	Note 4	On	Off
	Between T2 and T3	Off	Off	Note 4	Off	Off	On	Off	On	Off
	T3	On	Off	Note 4	Off	On for 1200 bps	On	Note 4	Off	On
	Between T3 and T4	Off	Off	Note 4	Off	Off	On	Off	Off	On
	T4	On for 4 wire	Note 3	Note 4	Off	On for 1200 bps	On	Note 4	Off	On
	Between T4 and Operate	Off	Off	Note 4	Off	Off	On	Off	Off	On

Notes

1. The '-request to send test op' line is active when the '-DS request to send' line B-A1V2B10 (line 1); B-A2V2B10 (line 2) is active.
2. The '-transmit send data' line is active when the '-DS send data space' line B-A1V2B13 (line 1); B-A2V2B13 (line 2) is active.
3. The '-transmit send data' line is active when the '-DS receive data space' line B-A1V2B12 (line 1); B-A2V2B12 (line 2) is active.
4. See FSL page FA707 (line 1); FA792 (line 2).

Figure 31-27. Test/Operate Switch Positions and Modem Lines

31-420 Transmit Level Limiting Check

The level control circuit of the CBS data coupler (or similar coupler) can be set to a lower signal level than the transmit level on the modem. When this is the case, overloading of the level control circuit causes slow recovery after turnaround, and the first part of the received signal might be lost. The modem transmit level (normal, SNBU, and answer tone) must be decreased in amplitude enough to prevent overloading in the CBS coupler.

To check for transmit level limiting:

1. Connect a decibel meter across the DT (data tip) and DR (data ring) terminals of the modem at the CBS coupler interface. Set the meter to bridging (no terminating resistance).
2. Set the Test/Operate switch to T4 (receive) and make a telephone connection with a modem that has its Test/Operate switch set to T3 (transmit).
3. Turn the Test/Operate switch from T4 to T3 (transmit) and observe the meter. If the reading goes down from the earlier level (which should be the level on the preamplifier or SNBU card) in less than 3 seconds, the coupler is limiting the transmit level. If the reading remains at the earlier level, that level is being transmitted to the line.
4. If the coupler is limiting the transmit signal level, decrease the amplitude of the preamplifier or SNBU card until the transmit level is below the controlled level in the coupler (limiting no longer takes place). (The correct level is one decibel lower than the level in step 3.) Set the answer tone to the same level.
5. Check to see that another modem receives a suitable signal level when this modem transmits by doing the following:
 - a. Set the Test/Operate switch to T3. Have another person set the Test/Operate switch at the remote station to T4.
 - b. Have someone at the remote station connect a decibel meter across the DT (data tip) and DR (data ring) terminals of the modem at the CBS coupler interface. The meter must be set to bridging (no terminating resistance).
 - c. For best operation, the receive level at the remote station should be 16 dB less than the transmit level. However, an acceptable receive level could be from -31 dB up to the same level as the transmit level.

31-430 Signal Quality Meter Adjustment

If the post-processor card in B-A1N4 (line 1) or B-A2N4 (line 2) is swapped, adjust the signal quality meter as follows:

1. Turn modem power on and turn the Test/Operate switch to T1.
2. Assuming there are no failures in test 1, adjust the potentiometer on the B-A1N4 card (line 1), or B-A2N4 (line 2) until the meter reads above zero (half of the smallest division on the meter scale).
3. Check the meter reading against the measurement made at installation time; the meter readings should be approximately the same. Make this check with the modem in operate mode.

31-440 Dial Tone Detect

Note: The dial tone detect adjustment is optional; make the adjustment only if necessary.

The dial tone detect circuits prevent the dial tone received by a modem from being decoded as random data; these circuits should be activated only if all of the following conditions are present:

- The 2400-bps modem automatically answers incoming calls,
- The data communications feature is set up for automatic operation, and
- The DTE does not time out and does not automatically disconnect when the dial tone is sensed, which causes wrong data to be decoded. For example, assume the DTE is set up for automatic operation and an incoming call is a wrong number. When the other end disconnects, the modem will decode the dial tone as data. Dial tone detect will prevent this error but it will not disconnect the line. Disconnecting the line must be done through programming.

Note: Normally, the dial tone detect circuit will not be activated in the modem. However, if the dial tone detect circuit is adjusted so that the circuit is activated (the adjustment is not correct), the 'receive data' line may be intermittently held to a mark level. This line held to a mark level could occur if the dial tone detect potentiometer is adjusted too far clockwise. Also, the 'receive data' line might be held to a mark level when valid data is being received.

Dial Tone Detect Service Check

To activate the dial tone detect circuit, attach a jumper from B-A1H3D09 to B-A1G2B04 (line 1), or B-A2H3D09 to B-A2G2B04 (line 2).

The dial tone detect service check procedure is as follows:

1. Set the Test/Operate switch to T4.
2. Set the Talk/Data switch to Data.
3. Lift the telephone handset, pull up the Exclusion key, and listen for the dial tone. If there is no dial tone, the last call has not been disconnected, or there is an autoanswer or coupler problem.
 - Disconnect and attempt another call or,
 - Call and request that they disconnect.

If there is a dial tone:

- Put the telephone handset back on the cradle.
- Check to see that the Signal light comes on and that the Operate light starts flashing. (The Operate light should stop flashing and remain on 3 to 10 seconds after the Signal light comes on.)

If the Operate light stops flashing and remains on in 3 to 10 seconds after the Signal light comes on, the dial tone detect circuit is working correctly. Remove the jumper.

If the Operate light continues to flash, the dial tone detect adjustment must be made. Also, if the Operate light stops flashing in less than 3 seconds, the potentiometer is adjusted too far clockwise and the dial tone detect adjustment must be made.

Dial Tone Detect Adjustment

Note: It is important that the potentiometer adjustment be made in 20 seconds because on some telephone systems, a message is automatically put on the line after 20 seconds.

To adjust the dial tone detect circuit:

1. Perform the service check as described in the preceding paragraph. (Jumper must be installed.)
2. If the Operate light is not flashing, turn the potentiometer on card H3 counterclockwise until the light begins to flash.
3. Adjust the potentiometer clockwise very slowly until the Operate light stops flashing (is on constant), then turn the potentiometer 1/8 of a turn farther clockwise.
4. Lift the handset and put it back on the cradle. If the Operate light does not stop flashing in 3 to 10 seconds, repeat the adjustment.

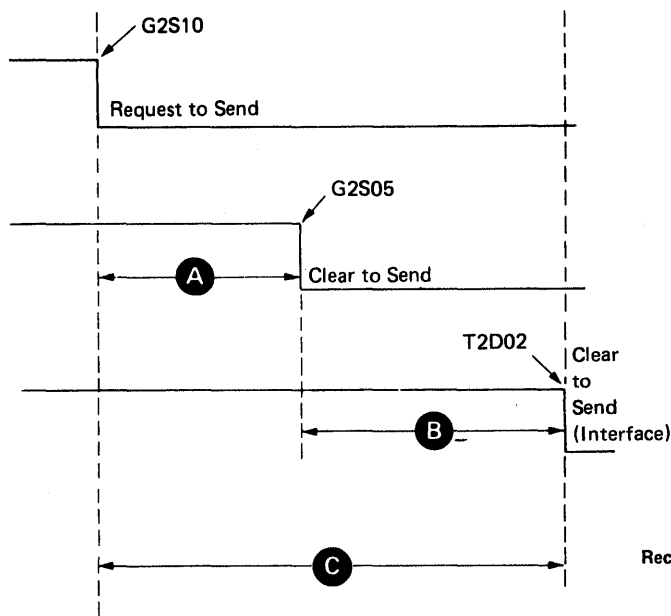
If the adjustment cannot be made, swap the H3 card and make the adjustment again.

31-450 Interface Signal Timings

The following timings can aid in determining if the timing circuits are working correctly. These timing circuits are located on the FET (field effect transistor) card (G2), the AEQ/AEL digital card (E2), and the SNBU timing card (K3).

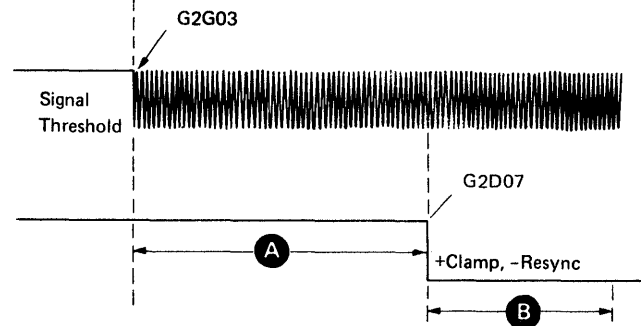
The signals shown here are generated by turning the Test/Operate switch to T1 from a reset position. Sync (minus) the oscilloscope on 'request to send' at Q4G09 to obtain the following signals.

Clear-to-Send Time



- A** — Determined by CSCD card jumper options. (see paragraphs 31-471 through 31-477)
- B** — Extra delay with long initial clear to send; 980 ms (AEQ) or 1,500 ms (SNBU). This delay is 30 ms for SNBU without long initial clear to send.
- C** — Clear to send delay as seen by DTE.

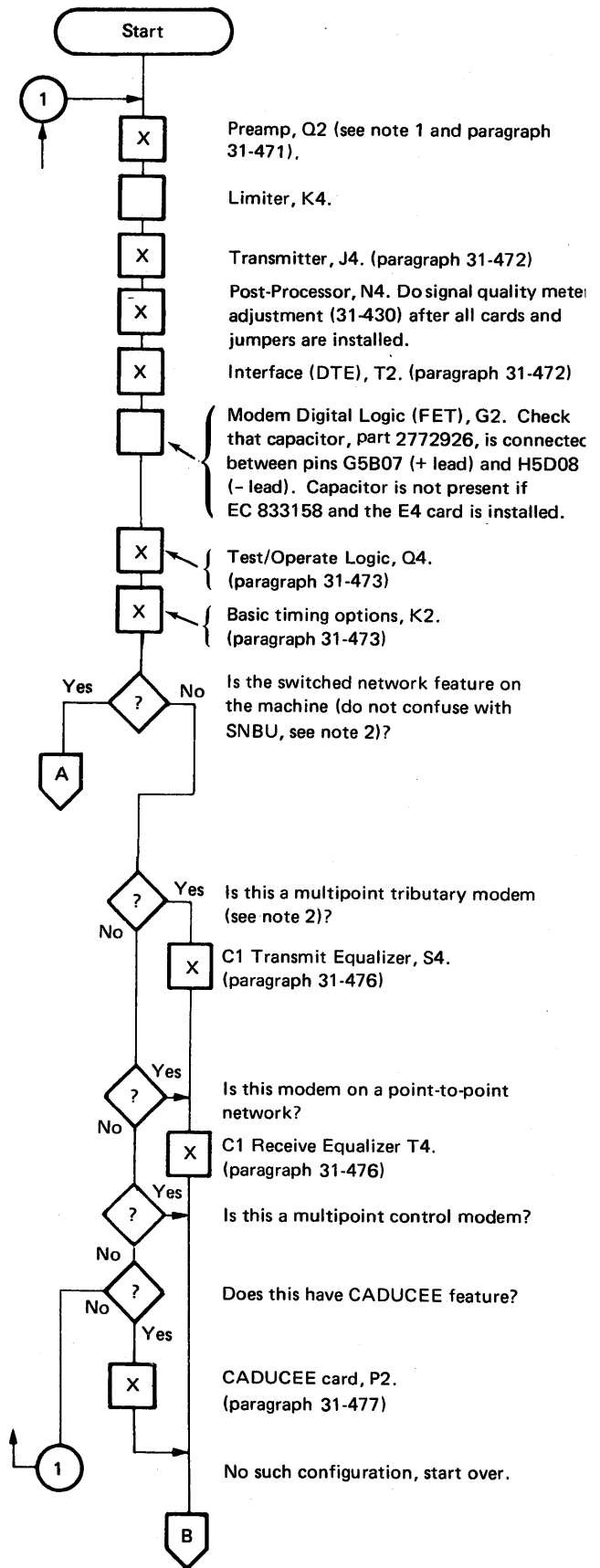
Receiver Unclamp Time



- A** — Determined by CSCD card jumper options. (see paragraphs 31-471 through 31-477)
- B** — Extra delay of about 800 ms appears in modems with auto equalizer at G2D07 ('+clamp, -resync') before the signal settles at the '-resync' level.

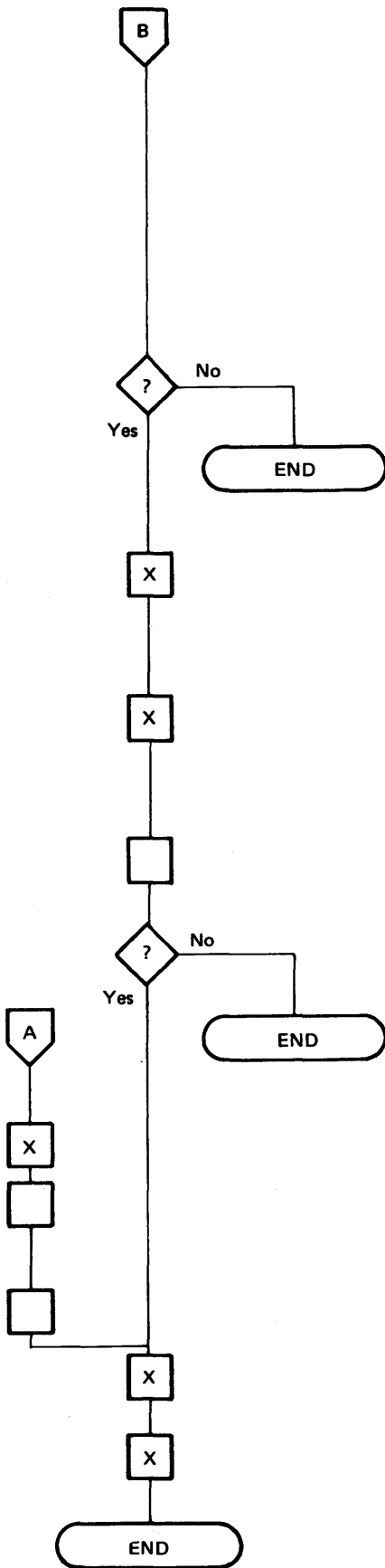
31-460 Card Check

The following flowchart gives the correct locations of each card needed for a given configuration of the 2400-bps integrated modem. Cards that need jumpers have an X in the square blocks that represent each card. (For line 1, the cards are installed in the B-A1 board. For line 2, the cards are installed in the B-A2 board.) The paragraph number for the correct jumper selection is shown in the flowchart. See the figures in paragraphs 31-471 through 31-477 for the jumper selections.



Notes:

1. The modem is internally set for 0 dbm transmit levels. Attenuate this level by attaching the correct jumper on the Q2 card if a lower level is specified by the common carrier. The transmit level may be marked on the common carrier line coupler box (1000-B, CDT, CBS).
2. For modem with CADUCEE feature (WT):
 - a. Switched network feature not on the machine.
 - b. If unconditional continuous carry is needed, attach a jumper from K4D11 to T2G03.
 - c. This is not a multipoint tributary modem; it is not a point-to-point network. The card installed at P2 is the CADUCEE feature card. Card jumpers are shown in paragraph 31-477.



Is the SNBU feature on the machine?

SNBU (standby), M2 (see note 1 and paragraph 31-474). For auto-request-to-send (continuous carrier), add jumper from M2G02 to T2B09.

Standby (SNBU) Timing, K3. (paragraph 31-473)

Compromise Equalizer, L2.

Is the Automatic Answering option on SNBU?

Switched Timing (echo clamp, H3). (paragraph 31-473)

AEQ Digital Logic, E2. Check that diode (part 2772927) is connected between E2G09 (cathode) and E2J07 (anode). Diode is not present if EC 833158 and the E4 card is installed.

AEQ Analog, D2.

AA Coupler Interface, S3. (paragraph 31-475)

AA Basic, R2 (see note 1 and paragraph 31-475)

Notes:

1. The modem is internally set for 0 dbm transmit levels. Attenuate this level by attaching the appropriate jumper on the Q2 card if a lower level is specified by the common carrier. The transmit level might be marked on the common carrier line coupler box (1000-B, CDT, CBS).
2. For modem with CADUCEE feature (WT):
 - a. Switched network feature is not on the machine.
 - b. If unconditional continuous carrier is required, attach a jumper from K4D11 to T2G03.
 - c. This is not a multipoint tributary modem; it is not a point-to-point network. The card installed at P2 is the CADUCEE feature card. Card jumpers are shown in paragraph 31-477.

31-470 Card Jumpers

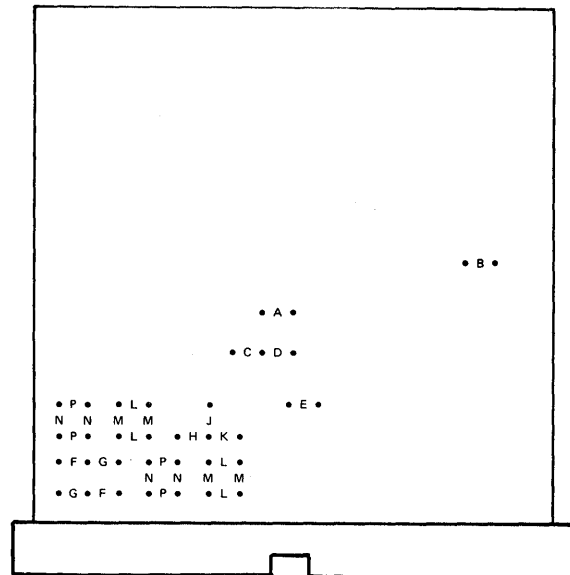
The following paragraphs (31-471 through 31-477) show which jumpers should be attached to the 2400-bps integrated modem cards located on the B-A1 board (line 1) and the B-A2 board (line 2). If a position on a card does not need a jumper, that position will be marked as *not used*. Similarly if a position needs a jumper, that position will be marked *needed*. The remaining jumper locations are optional and each is described in the following paragraphs. When attaching the jumpers to the card, use jumper 816645. If these jumpers are not available, use any insulated jumper. Also, the jumper must be connected to the two pins on opposite sides of the correct letter (vertically or horizontally) as shown in the figures in paragraphs 31-471 through 31-477.

31-471 Preampfier Jumpers

Attenuation from 0 decibels (H, J, K — one location each; L, M, N, P — four locations each)

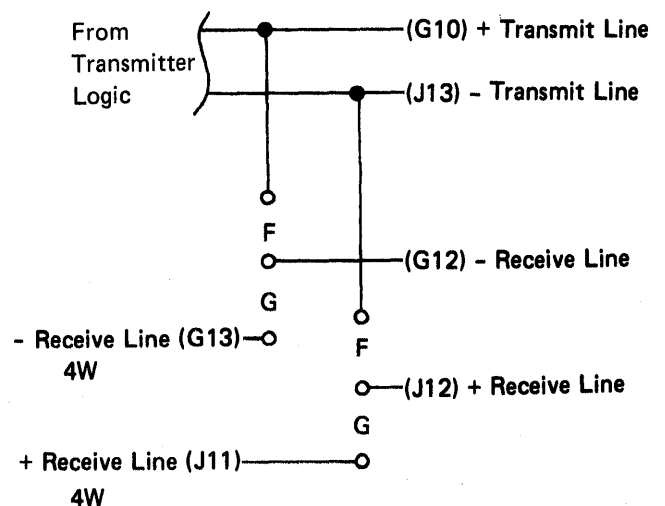
- 0 — M, P
- 1 — H, M, P
- 2 — J, M, P
- 3 — K, M, P
- 4 — L, P
- 5 — H, L, P
- 6 — J, L, P
- 7 — K, L, P
- 8 — M, N
- 9 — H, M, N
- 10 — J, M, N
- 11 — K, M, N
- 12 — L, N
- 13 — H, L, N
- 14 — J, L, N
- 15 — K, L, N

Note: Transmit level is jumpered for 0 decibels for nonswitched lines in the United States and Canada; it is jumpered for the level indicated on the coupler for switched lines, and it is jumpered for -6 decibels for French CADUCEE lines.

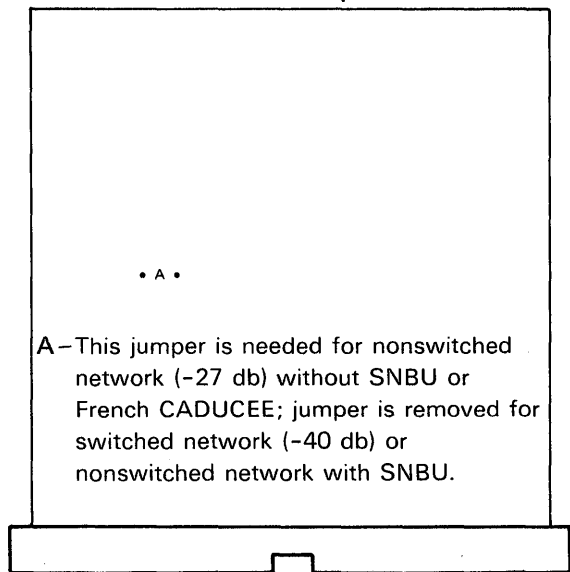


B-A1Q2 (line 1); B-A2Q2 (line 2)

- A — Jumper is needed for switched network (-40 db) or nonswitched network with SNBU; jumper removed for nonswitched network without SNBU (-27 db) and for French CADUCEE networks.
- B — Jumper is needed for 4-wire without SNBU; jumper removed for 2-wire or SNBU.
- C — Not used.
- D — Needed.
- E — Needed.
- F — Needed for 2-wire (two locations). See the following figure.
- G — Needed for 4-wire (two locations). See the following figure.



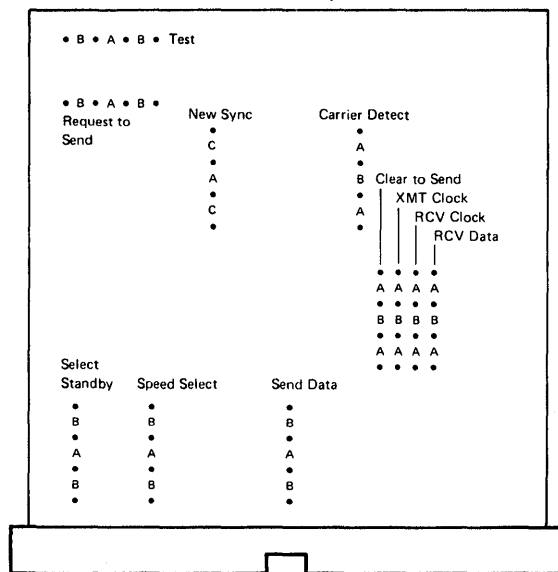
Transmit Jumper



A—This jumper is needed for nonswitched network (-27 db) without SNBU or French CADUCEE; jumper is removed for switched network (-40 db) or nonswitched network with SNBU.

B-A1J4 (line 1); B-A2J4 (line 2)

Interface Jumpers



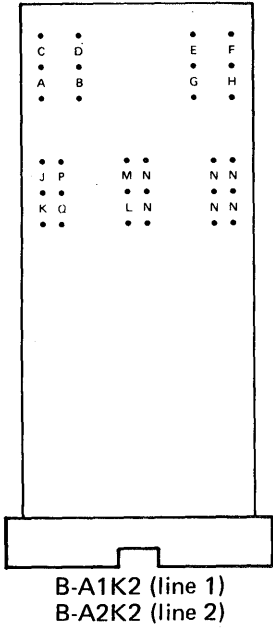
B-A1T2 (line 1); B-A2T2 (line 2)

- A — Not used (EIA/CCITT interface)
- B — Needed (15 locations)
- C — New Sync (installed only for a multipoint control modem that needs New Sync). If New Sync is used, one of the following board jumpers must be installed:
 - Line 1: 01A-A2J2M04 to 01A-A2Q6B02
 - Line 2: 01A-A2K2M04 to 01A-A2M6A02

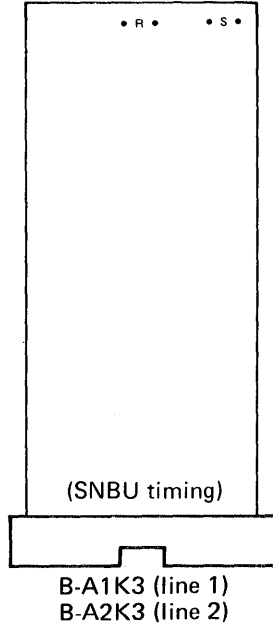
Clear to Send Jumpers

- A, B – 8.5 ms
- A, D – 25 ms
- B, C – 75 ms
- C, D – 147 ms
- L – 75 ms SNBU
- M – 147 ms SNBU

Basic Timing Options



Feature Timing Options

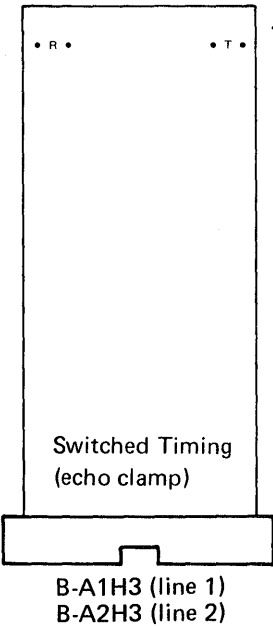


Carrier Detect Jumpers

- G, H – Needed for every option

Remaining Jumpers

- J – 4-wire
- K – 2-wire
- P – Short carrier detect, no echo clamp
- Q – 56 or 123 ms carrier detect, no echo clamp
- R – 50 ms echo clamp (100 ms if not strapped)
- S – No echo clamp during nonswitched line operation

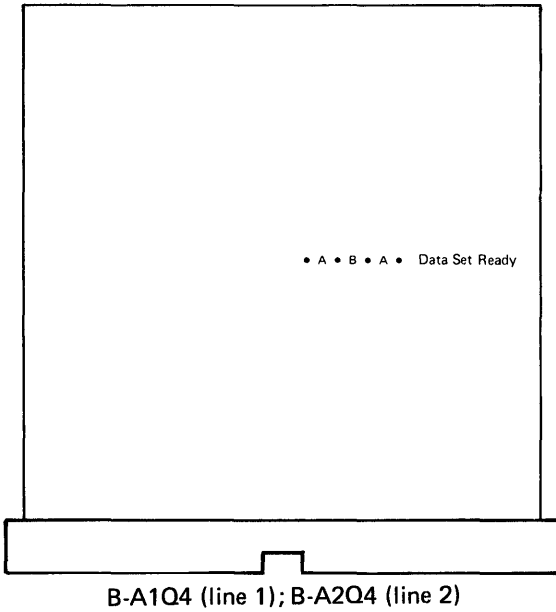


Modem	Echo Suppressors?	LL Clear To Send (ms)	SNBU/Switched Network Clear To Send (ms)	Timing Options Strapping
4WLL-SNBU ^{6,7}	–	8.5 ²		A, B, G, H, J, P
		25		A, D, G, H, J, P
4WLL-SNBU ^{5,7}	–	8.5 ²	75 ¹	A, B, G, H, J, L, R, S
			147	A, B, G, H, J, M, S
		25	75 ¹	A, D, G, H, J, L, R, S
			147	A, D, G, H, J, M, S
2WLL-SNBU	NO	75 ³		B, C, G, H, K, Q
		147		C, D, G, H, K, Q
	YES	75 ³		B, C, G, H, K, P
		147		C, D, G, H, K, P
2WLL-SNBU	–	75 ³	75 ¹	B, C, G, H, K, L, R
			147	B, C, G, H, K, M, R
		147	147	C, D, G, H, K, M
Switched Network	–		75 ³	B, C, G, H, K, R, T ⁴
			147	C, D, G, H, K, T ⁴
CADUCEE	–	25		A, D, G, H, J, P

- 2WLL – 2-wire nonswitched line
- 4WLL – 4-wire nonswitched line
- SNBU – With SNBU
- SNBU – Without SNBU

¹ Permissible only if SNBU operation is in the local area.
² Used only on multipoint tributary modems when 'new sync' is used at the control station.
³ Used only on short lines, where turnaround is critical and the communications facility characteristics are suitable (minimum echo).
⁴ This jumper is installed if any modem in the network does not have the switched network sequence engineering change.
⁵ For all except a multipoint tributary modem, the continuous carrier board jumper must be installed (see 31-200 or FSL page AC395).
⁶ For all except a multipoint tributary modem, the communication adapter card must be set for continuous carrier (see 31-200).
⁷ If New Sync is required (multipoint control modems only), see paragraph 31-472 for required T2 card jumpers and 01A-A2 board jumpers.

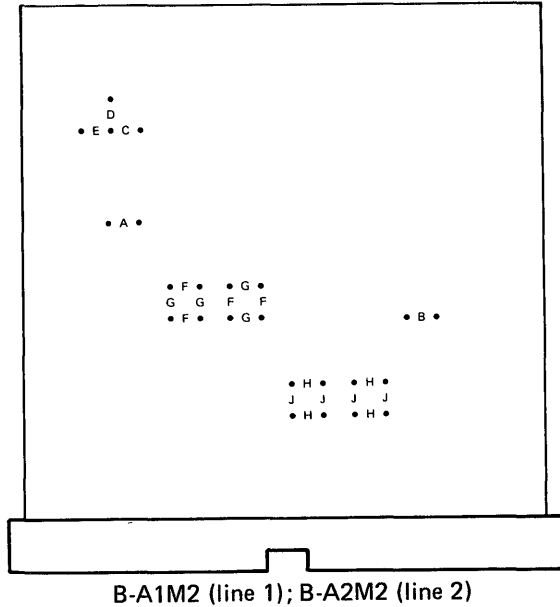
Test/Operate Basic Jumpers



- A — Not used (EIA/CCITT interface)
- B — Needed

31-474 SNBU Jumpers

Standby Feature Jumpers



- A — Needed
- B — Needed for 4-wire (not used for 2-wire nonswitched line)

SNBU Transmit Level Attenuation Jumpers

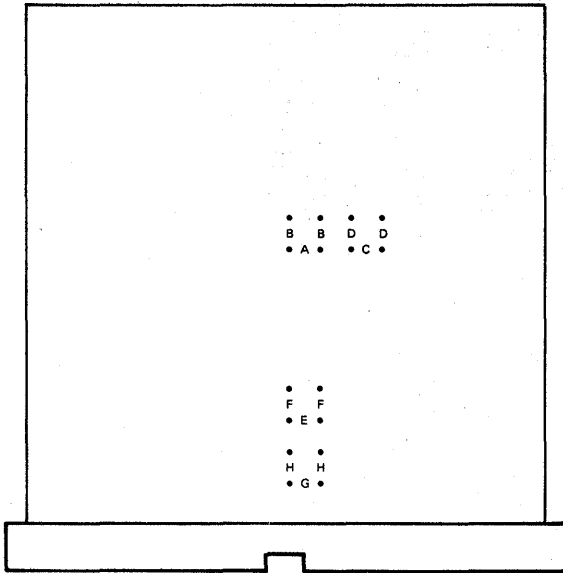
Note: Transmit level should be marked on coupler.

For jumper locations C, D, and E, attach one jumper; for jumper locations F, G, H, and J, attach all four jumpers.

- 0 db — G, J
- 1 db — C, G, J
- 2 db — D, G, J
- 3 db — E, G, J
- 4 db — F, J
- 5 db — C, F, J
- 6 db — D, F, J
- 7 db — E, F, J
- 8 db — G, H
- 9 db — C, G, H
- 10 db — D, G, H
- 11 db — E, G, H
- 12 db — F, H
- 13 db — C, F, H
- 14 db — D, F, H
- 15 db — E, F, H

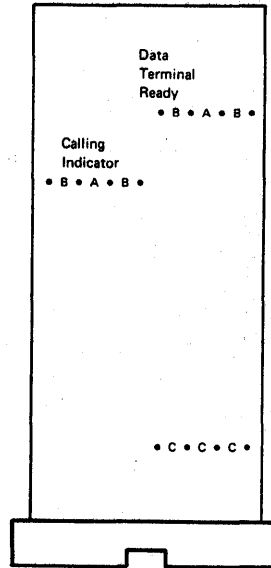
31-475 Automatic Answering Interface Jumpers

AA Common Feature Jumpers



B-A1R2 (line 1); B-A2R2 (line 2)

AA Interface Feature Jumpers



B-A1S3 (line 1)
B-A2S3 (line 2)

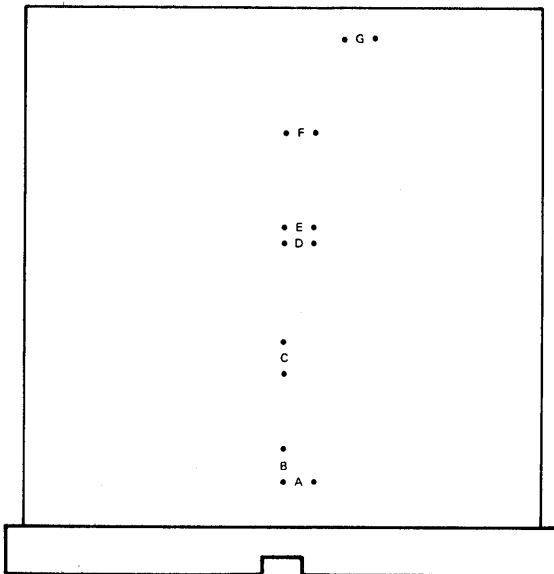
- A — Not used
- B — Needed (4 locations)
- C — Not used

Answer tone transmit level attenuation from 0 decibels (level specified on data coupler).

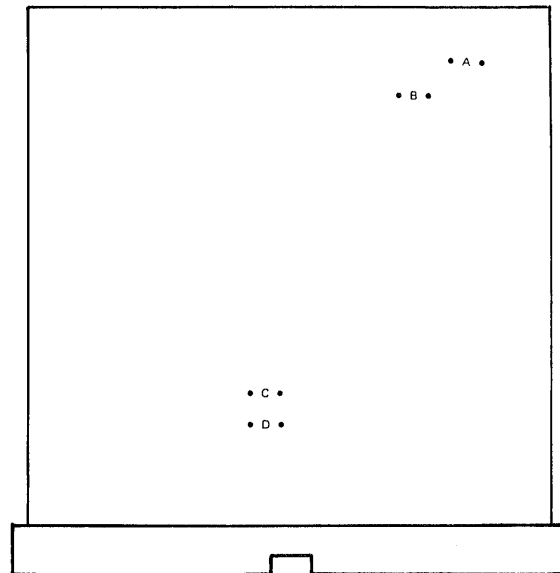
For jumper locations A, C, E, and G, attach one jumper; for jumper locations B, D, F, and H, attach both jumpers.

Decibels	Jumper Locations
0	A, C, E, G
-1	B, C, E, G
-2	A, D, E, G
-3	B, D, E, G
-4	A, C, F, G
-5	B, C, F, G
-6	A, D, F, G
-7	B, D, F, G
-8	A, C, E, H
-9	B, C, E, H
-10	A, D, E, H
-11	B, D, E, H
-12	A, C, F, H
-13	B, C, F, H
-14	A, D, F, H
-15	B, D, F, H

C1-A Equalizer Basic Jumpers



- Receive – B-A1T4 (line 1); B-A2T4 (line 2)
- Transmit – B-A1S4 (line 1); B-A2S4 (line 2)
- A – Not used
- B – Needed (amplitude equalization)
- C-G – Not used



B-A1P2 (line 1); B-A2P2 (line 2)

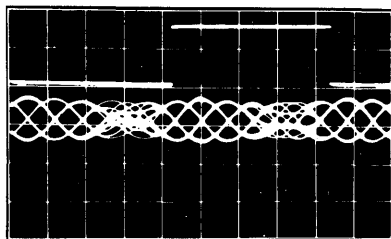
- A - Not used (In the CADUCEE feature, the 0.25 ms delay filter remains active for equalization.)
- B - Needed (disables 0.50 ms delay filter)
- C - Not used
- D - Needed

31-480 Waveshapes

The waveshapes are shown here because they are a reference from the MAPs; the MAPs reference the waveshapes by the associated waveshape number.

The board pin numbers shown with the waveshapes are all on the B-A1 board (line 1) and on the B-A2 board (line 2).

Waveshape 014A

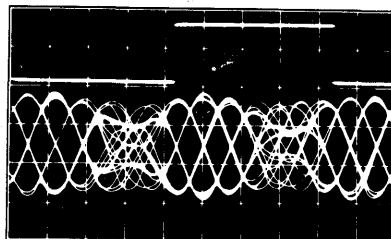


Scope settings:
 Triggering to -internal
 Time base to .2 ms/div
 Channel 1 to .5 v/div*
 Channel 2 to 50 mv/div*

G2S04
 Ramp Clock A

Q2D13
 Preamp Output—
 switched network
 or nonswitched line
 with SNBU (strapped
 for -40 db received
 sensitivity; that is,
 the A jumper on the
 Q2 card is attached
 and the A jumper
 on the J4 card is
 not attached).

Waveshape 014B

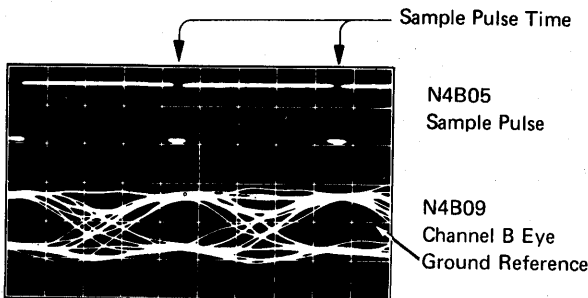


Scope settings:
 Triggering to -internal
 Time base to .2 ms/div
 Channel 1 to .5 v/div*
 Channel 2 to 100 mv/div*

G2S04
 Ramp Clock

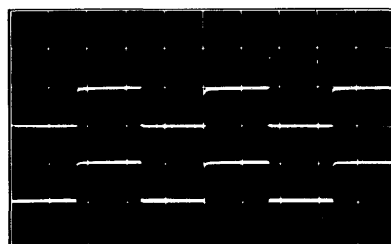
Q2D13
 Preamp Output—
 nonswitched line
 (strapped for -27 db
 receiver sensitivity;
 that is, the A jumper
 on the J4 card is
 attached and the A
 jumper on the Q2
 card is not attached).

Waveshape 030



Scope settings:
 Triggering to -internal
 Time base to .2 ms/div
 Channel 1 to .5 v/div*
 Channel 2 to 2 v/div*

Waveshape 070



Scope settings:
 Triggering to -internal
 Time base to .5 ms/div
 Channel 1 to 10 v/div*
 Channel 2 to 10 v/div*

N4B05
 Sample Pulse

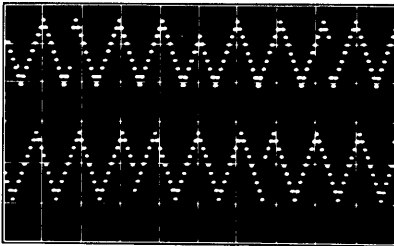
 N4B09
 Channel B Eye
 Ground Reference

 J4J12
 Ramp Clock A

 J4G10
 Ramp Clock B

* Use only X1 probe; waveshape may be distorted or not seen when scoping millivolt signals with X10 probe.

Waveshape 072A (see Note)

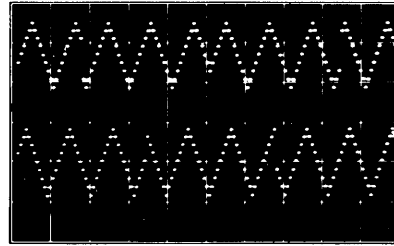


J4B09
Channel B
Transmit

J4D02
Channel A
Transmit

Scope settings:
Trigger to — on G2S04
Time base to .5 ms/div
Channel 1 to .5 v/div*
Channel 2 to .5 v/div*

Waveshape 072C (see Note)

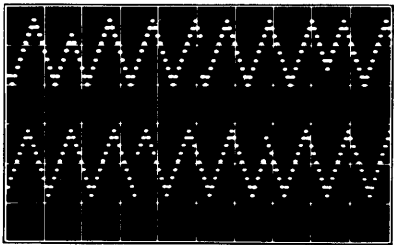


J4B09
Channel B
Transmit

J4D02
Channel A
Transmit

Scope settings:
Trigger to — on B-A1G2S04
Time base to .5 ms/div
Channel 1 to .5 v/div*
Channel 2 to .5 v/div*

Waveshape 072B (see Note)

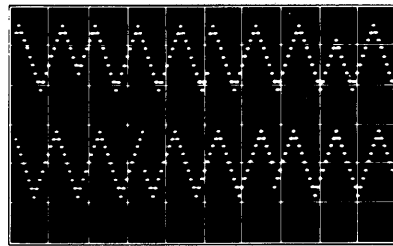


J4B09
Channel B
Transmit

J4D02
Channel A
Transmit

Scope settings:
Trigger to — on G2S04
Time base to .5 ms/div
Channel 1 to .5 v/div*
Channel 2 to .5 v/div*

Waveshape 072D (see Note)



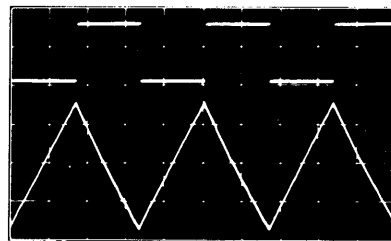
J4B09
Channel B
Transmit

J4D02
Channel A
Transmit

Scope settings:
Trigger to — on G2S04
Time base to .5 ms/div
Channel 1 to .5 v/div*
Channel 2 to .5 v/div*

Note: Observe the oscilloscope carefully. Depending upon how sync actually triggers the sweep, wave forms 072A, 072B, 072C or 072D may be displayed. *A correct wave form always has nine dots vertically, and phase changes always appear as a compressed wave form with four dots omitted.* At 2400 bps, three full cycles appear between phase changes; at 1200 bps, six cycles appear between changes. Phase changes are staggered.

Waveshape 076



G2S04
Ramp Clock A

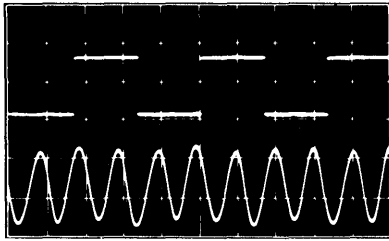
J4D11
Ramp Test Point

Scope settings:
Triggering to -internal
Time base to .5 ms/div
Channel 1 to .5 v/div*
Channel 2 to .1 v/div*

(Channel 2 is on AC input.)

* Use only X1 probe; waveshape may be distorted or not seen when scoping millivolt signals with X10 probe.

Waveshape 078

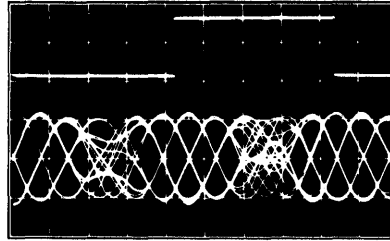


G2S04
Ramp Clock A

J4D05
Analog Transmit
Signal

Scope settings:
Triggering to -internal
Time base to .5 ms/div
Channel 1 to .5 v/div*
Channel 2 to 1 v/div*

Waveshape 090

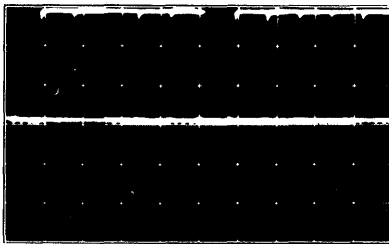


G2S04
Ramp Clock A

Q2B02
Preamp Wrap
Signal Input

Scope settings:
Triggering to -internal
Time base to .2 ms/div
Channel 1 to .5 v/div*
Channel 2 to 5 v/div*

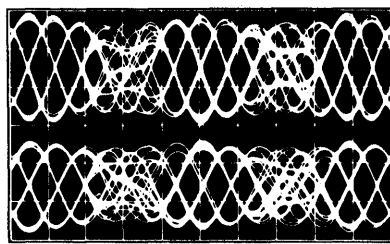
Waveshape 081



G2G09
Scrambler Output

Scope settings:
Triggering to -internal
Time base to .5 ms/div
Channel 1 to 2 v/div*

Waveshape 160



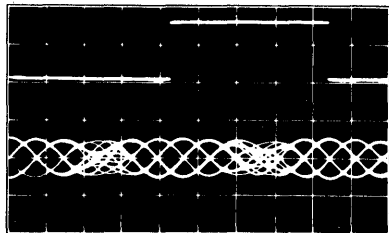
Q2D13
Preamp Output
(strapped -27 db on
Q2 and J4)

K4D05
Limiter Input
(strapped -27 db on
Q2 and J4)

Scope settings:
Triggering to — on G2S04
Time base to .2 ms/div

Approximate signal amplitude:
Channel 1, 300 mV (60 mV if strapped -40 db)
Channel 2, 250 mV with C1 equalizer (-27 db)
or automatic equalizer (-40 db)
50 mV with C1 equalizer (-40 db)
60 mV with compromise equalizer
(SNBU wrap) (-40 db)

Waveshape 088

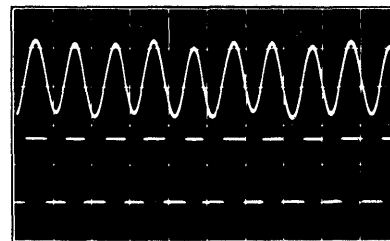


G2S04
Ramp Clock A

J4G09 or
S4J09
Line Driver Input

Scope settings:
Triggering to -internal
Time base to .2 ms/div
Channel 1 to .5 v/div*
Channel 2 to 2 v/div*
(Channel 2 is on AC input.)

Waveshape 163



K4D05
Limiter Input
(strapped -27 db
on Q2 and J4)

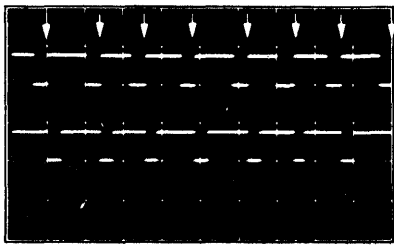
K4B02
Limiter Output

Scope settings:
Triggering to — on G2S04
Time base to .5 ms/div
Channel 1 as shown in waveshape 160
Channel 2 to 5 v/div*

* Use only X1 probe; waveshape may be distorted or not seen when scoping millivolt signals with X10 probe.

Waveshape 166

Note: The arrows in this wave form show the relationship between the two signals; channel B signal drops as channel A signal rises.

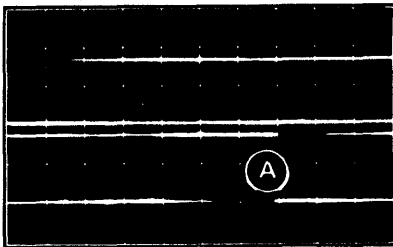


N4D05
Channel A Filter

N4B02
Channel B Filter

Scope settings:
Triggering to - on G2S04
Time base to .2 ms/div
Channel 1 to 1 v/div*
Channel 2 to 1 v/div*

Waveshape 173A



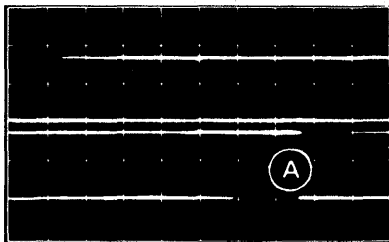
K4B02
Limiter Output

K4D02
Limiter Output
Delayed 450°
(2400 bps)
(shift register
bit 80).

Scope settings:
Triggering to -internal
Time base to .1 ms/div
Channel 1 to 5 v/div*
Channel 2 to 5 v/div*

Note: Check to see that the signal changes (as marked by **A**).

Waveshape 173B



K4B02
Limiter Output

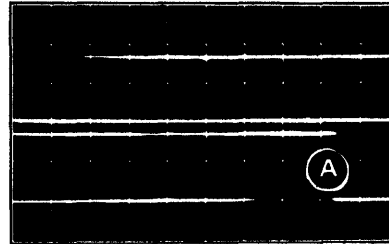
K4D04
Limiter Output
Delayed 990°
(1200 bps)
(shift register
bit 88)

Scope settings:
Triggering to -internal
Time base to .1 ms/div
Channel 1 to 5 v/div*
Channel 2 to 5 v/div*

Note: Check to see that the signal changes (as marked by **A**).

* Use only X1 probe; waveshape may be distorted or not seen when scoping millivolt signals with X10 probe.

Waveshape 173C



K4B02
Limiter Output

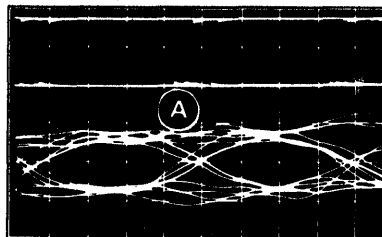
K4B05
Limiter Output
Delayed 540°
(2400 bps) or
1080° (1200 bps)
(shift register bit
96)

Scope settings:
Triggering to -internal
Time base to .1 ms/div
Channel 1 to 5 v/div*
Channel 2 to 5 v/div*

Note: Check to see that the signal changes (as marked by **A**).

Waveshape 183

Intensity might have to be increased to see a good signal.



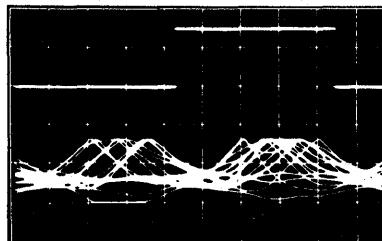
N4D04
Channel A Receive
Data
N4D06
Channel B Receive
Data

N4G02
Channel A Eye
N4B09
Channel B Eye

Scope settings:
Triggering to - on G2S04
Time base to .2 ms/div
Channel 1 to 5 v/div*
Channel 2 to 2 v/div*

Note: Check to see that the signals change (as marked by **A**).

Waveshape 248



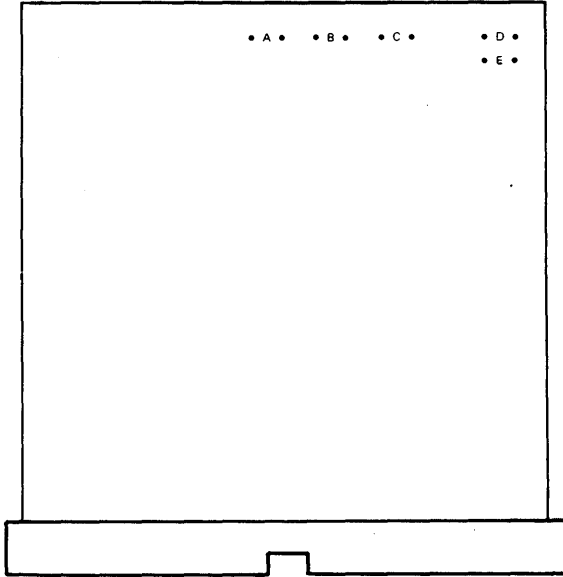
G2S04
Ramp Clock A

D2U05
Channel B Eye
Rectified

Scope settings:
Triggering to -internal
Time base to .2 ms/div
Channel 1 to .5 v/div*
Channel 2 to 5 v/div*

31-500 DIGITAL DATA SERVICE ADAPTER

The Digital Data Service Adapter cards in A-A2H2 (line 1) and A-A2H4 (line 2) have five jumper locations; attach these jumpers as instructed in Figure 31-28.



A-A2H2 (line 1); A-A2H4 (line 2)

- A — Needed for 2,400 bps Operation (see Note)
- B — Needed for 4,800 bps Operation (see Note)
- C — Needed for 9,600 bps Operation (see Note)
- D — Not used
- E — Needed for multipoint operation (disables the channel service unit loop-back)
Not used for point-to-point operation (enables the channel service unit loop-back in test mode)

Note: The bits per second rate must be set to the rate specified in the customer's order for service to the common carrier. Clocking is controlled by the common carrier central office.

Figure 31-28. Card Jumpers for the Digital Data Service Adapter

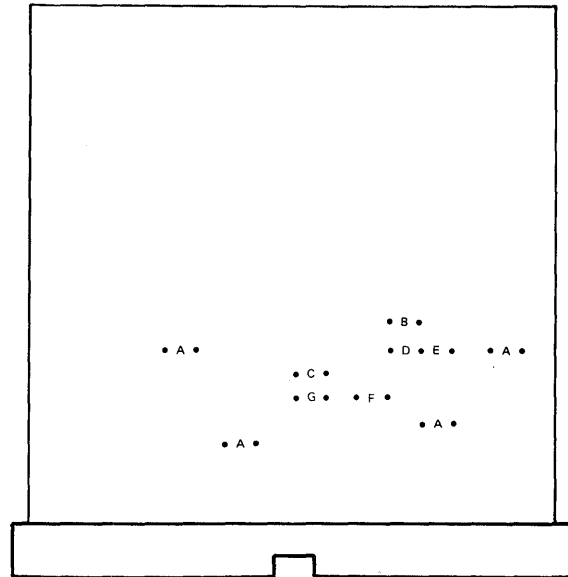
31-600 EIA/CCITT INTERFACE

31-610 Card Jumpers

The EIA/CCITT cards in A-A2H2 (line 1) and A-A2H4 (line 2) have 10 jumper locations but none of the jumpers are needed.

If you have a multipoint control modem that needs *new sync*, the following jumpers are added for each line:

Line 1	A-A2H4G08	to	A-A2K1B11
Line 2	A-A2H4G08	to	A-A2K6B02



A-A2H2 (line 1); A-A2H4 (line 2)

- A — Not used or missing (four locations)
- B — Not used
- C — Not used
- D — Not used
- E — Not used
- F — Not used
- G — Not used

31-620 EIA/CCITT Modem Control Lines

The modem control lines, for the EIA/CCITT interface are active during the up level. These lines and their associated pin numbers are shown in Figure 31-3 and Figure 31-29. The following paragraphs describe eight of these lines.

The 'RTS' (request to send) line controls the transmit and receive functions of the modem. When this line is active, the modem is in transmit mode; when not active, the modem is in receive mode. On a 2-wire nonswitched line, 'RTS' is switched by System/34. On a 4-wire nonswitched line, 'RTS' can be switched by System/34; held permanently on by System/34 or; held permanently on by the modem. On a switched line, 'RTS' is switched by System/34. The 'RTS' line is on during the transmission of each block or frame.

The 'standby' line selects the switched network backup (SNBU) line.

The 'test' line selects the modem wrap function. When the modem wrap test is running, the transmit function of the modem is sent back to the receive function of the modem.

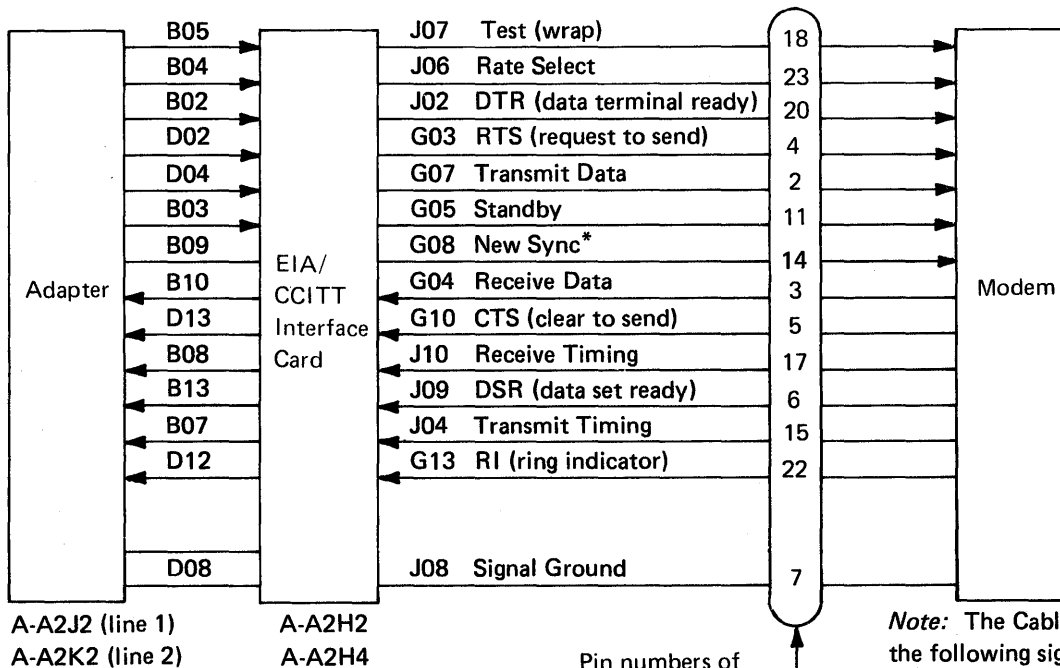
The 'DTR' (data terminal ready) line signals the modem that the terminal is ready to send or receive data. On a switched line, 'DTR' initializes and holds the line connection.

The 'rate' select line selects the bit rate on modems with half speed. When this line is down, half speed is selected.

The 'CTS' (clear to send) line indicates that the modem is ready to transmit data. On a 4-wire nonswitched line, 'CTS' can be active all the time. On a 2-wire nonswitched or switched line, 'CTS' is turned on and off by 'RTS'.

The 'DSR' (data set ready) line indicates that the modem is ready. The modem is ready when power is on, when the modem is connected to the line, and when the modem is not in test mode; all three conditions must be met.

The 'ring indicator' line indicates that the modem is receiving a call.



A-A2J2 (line 1)
A-A2K2 (line 2)
A-A2H2
A-A2H4
*New Sync requires a board jumper

Pin numbers of the RS232/CCITT connector

Note: The Cable wrap connector connects the following signals for testing:
DTR to DSR
RTS to RI
Transmit Data to CTS
Rate Select to Transmit Timing
Wrap to Receive Data
Standby to Receive Timing

Figure 31-29. Modem Control Lines for EIA/CCITT Interface

